The FLEET OWNER

MAR 1 1920

In This Issue:—

Saving $35,000 a Year
Timing Valves and Ignition
Delivering Fuel Oil Quickly
Colors for Delivery Vehicles
How Macy Reduced Accidents

Approved by Authority!

Nonscor *flexible* Brake Lining

One of the country's largest car manufacturers recently adopted Nonscor for leading cars of its line! Nothing like this novel brake lining with the exclusive patented feature that prevents scoring of brake-drums—gives better brake performance. Enables complete adjustment at installation—no follow up service necessary — simplifies your stocking problem. Write now for information.

UNION ASBESTOS & RUBBER CO.

18th St. & 54th Ave., Cicero, Ill.
(Suburb of Chicago)

FLEXIBLE!

6 years old . . .
. . . and still on the job!

ALMOST every day we receive fresh evidence that "famous fleets depend on the Robert Bosch Super-Energy Magneto." Thus a letter comes in from the Interurban Transit Lines, Inc. This company operates The Short Way Lines out of Toledo, Ohio. There are 27 coaches in the fleet. 23 of them are equipped with Robert Bosch Super-Energy Magnetos.

"Robert Bosch Magnetos give much better service," testifies Mr. D. M. Temple, Assistant General Manager, "than any other make we know of. Those turned out six years ago are still in service although they had to be reconditioned, as the best life that anyone can hope for on a magneto without overhaul is 75,000 miles!"

75,000 miles without reconditioning! That *is* dependability—whether you measure dependability in terms of keeping up schedules or keeping down costs.

To enable you to make a test of the Robert Bosch Super-Energy Magneto on one of your trucks or buses without risk, we offer the Trial Purchase Plan. Ask your Robert Bosch service station about it—or write us direct for the details contained in 28-page booklet: "Lift the Hood."

All Robert Bosch Products bear the full name "ROBERT BOSCH" and this trademark of Robert Bosch A.-G.

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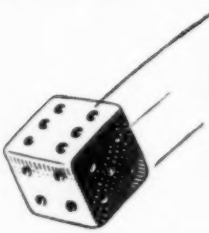
Robert Bosch
Super-Energy
Magneto

YOU CAN'T LEAVE HAULING TO CHANCE . . . .



Successful business men don't stock merchandise on chance. They don't price it without consideration of cost. They don't rely on chance patronage. Nor should they select their trucks by hit-or-miss methods.

Business men who own Dodge Trucks—there are thousands of them—have taken the chance out of truck selection. They have proved that these workers possess the very qualities valued by seasoned business men . . . . power for hill or hole—speed for time-saving hauling—dependability to serve unflinchingly—economy as consistent as it is thorough—good looks you will be proud of—comfort and ease of control that make for contented drivers.

DODGE TRUCKS

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"For Those Who

The FLEET OWNER

Service Their Own"

Published Monthly by

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HENRY CLAY FISCHER
Editor

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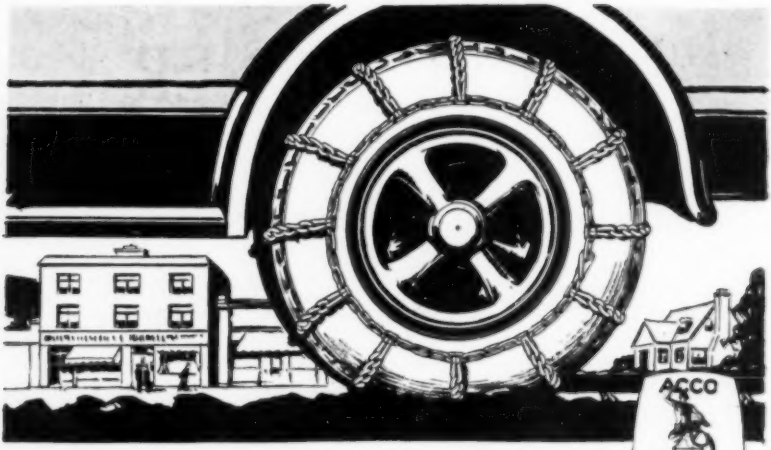

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Ask any big fleet operator. He will tell you that WEED Chains keep his winter operating cost in the black . . . out of the red.

WEED Chains are made for all types and sizes of pneumatic and solid tires. Equip every truck and delivery car.

AMERICAN CHAIN COMPANY, *Inc.*
BRIDGEPORT, CONNECTICUT

World's Largest Manufacturer of Welded and Weldless Chains for ALL Purposes. District Sales Offices: **Boston, Chicago, New York, Philadelphia, Pittsburgh, San Francisco. *In Canada:* Dominion Chain Company, *Limited*, Niagara Falls, Ontario**

WEED CHAINS

How Much is Chassis Wear Costing You?

On every car, truck or bus in your fleet, chassis wear is wrecking havoc,—destroying its efficiency.

Wobbly, shimmying, mis-aligned wheels due to worn king and tie rod bolts and bushings are grinding out tires, making steering difficult.

Squeaks, rattles and side-sway result from worn shackle bolts and bushings.

Renew these worn parts with

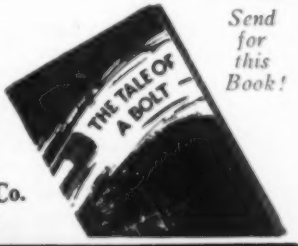
BLUE PRINT
Bolts *and* Bushings

and add to the life of both tires and vehicles. BLUE PRINT parts are made to the car manufacturers' blue print specifications and insure a continuation of original equipment service.

Labor Saving B/P Tools

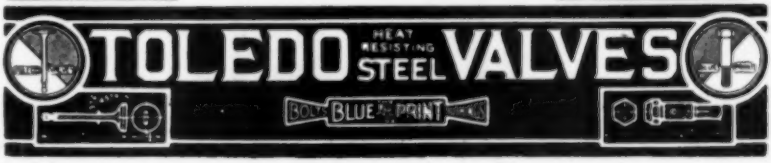
B/P bolt and bushing tools make the detection of these worn parts and their removal and replacement quick, easy and economical because they save one-half the time and labor.

Ask your Jobber for Blue Print Bolts and Bushings and the B/P tools or write us for a copy of booklet, "The Tale of a Bolt".



Send for this Book!

The Toledo Steel Products Co.
Toledo, Ohio, U. S. A.



That 4th Speed demands HANDY GOVERNORS

WITH its four-speed transmission, the new Ford truck demands, more emphatically than ever, the automatic protection afforded by a Handy Governor.

There's more temptation now to overspeed; the Handy prevents it. Equally vital, the Handy also prevents racing the motor in the low-ratio first or second gears—a form of abuse which can quickly ruin the finest piece of machinery.

Don't let irresponsible drivers shorten the trouble-free life of this splendid vehicle.

Sell every truck customer on the absolute necessity of Handy Governor equipment *from the very start.*

Standard equipment on nearly all large trucks. Built and guaranteed by the largest manufacturers of governors in the world.

HANDY GOVERNOR CORPORATION

Manufacturers of Handy, K. P. and Handy Servo Governors, Handy Oilfiltors, Handy Air Cleaners

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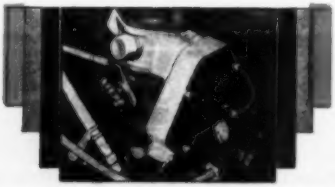


The FLEET OWNER

"For Those Who Service Their Own"

PUBLISHED monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops, and devoted to the better operation and maintenance of Trucks, Passenger Cars, Busses and Taxis.

HENRY CLAY FISCHER, Editor

Vol. 4 **New York, March, 1930** **No. 3**

Spare Tires and Fan Belts

AT first thought, there is no connection between spare tires and spare fan belts. After analyzing the two, however, we find that no fleet owner would send his pneumatic-equipped vehicles out without a spare tire, but on the other hand, few of them carry spare fan belts.

A spare fan belt has its place in every vehicle's tool box. Driving as it does, the fan and sometimes the water-pump and generator as well, it is not difficult to visualize what would happen if a fan belt wore out some miles away from a source of supply.

First, the circulation of water and the dissipation of the engine's heat would stop, immediately subjecting the engine to overheating ills, particularly during the spring and summer months. Assuming that the battery is only in fair condition, it would soon run down and might even cause the engine to go dead. The truck or bus would then be without lights and be powerless to continue.

This brings to mind the old familiar adage about the lost horse-

shoe nail, reproduced here as one being worth remembering:

"For want of a nail, the shoe was lost;
For want of a shoe, the horse was lost;
For want of a horse, the rider was lost;
For want of a rider, the kingdom was lost."

Applying this to the business of fleet operation, we can easily see how, for want of a spare fan belt, the engine might be ruined, the schedule of the bus or truck upset, and the *profits*, if not the kingdom, might be lost.

Fan belts are cheap, in comparison to kingdoms. A new one will have to be purchased anyway. Buy it now and throw it into the tool box. It will be used eventually. Fan belts should certainly be included in every set of "spares."

On the Front Cover

THIS month the picture on our cover brings to mind the fact that the Retail Delivery Association is holding its annual convention this month in Cleveland—from the 18th to the 21st, to be exact.

We are indebted to them for the cover picture which in itself is an excellent example of the longevity of a motor truck that is properly taken care of and intelligently operated. It is one of the fleet of sixty-three ¾-ton trucks owned by the Eleto Company of New York City, and used for suburban package deliveries for two prominent department stores in the same city. Every truck in this fleet will be eleven years old in July of this year.

One of the features of this particular truck is its built-in cab for the protection of the driver and helper in winter weather. The cab has a sliding door on the right side and the windshield is of the two-piece hinged type, for coolness in summer. The glass is mounted in four-piece metal frames to prevent glass breakage and give maximum vision.

This truck is used on one of the long distance suburban routes and up to the first of this year, its total mileage was 179,033. The screen-sided body with side curtains has proven the most economical type to maintain for the type of work it is engaged in. An announcement of the coming Retail Delivery Association Convention appears elsewhere in this issue.

The Editor.

Saving $35,000 a *Year*

How the Greyhound Lines' New Maintenance Procedure Promises a Saving of One Cent Per Bus Mile

By W. A. Duvall*

A SAVING of at least $35,000 a year is anticipated by the Greyhound Lines on its new Chicago and Detroit garages. This figure is based on an estimated saving in maintenance of one cent per bus mile on the operation of 3,500,000 miles per year out of Chicago and Detroit. Still further economies are expected through the elimination of a great deal of costly maintenance service previously handled on the outside.

Early in the history of its operations, the Greyhound Lines recognized the importance of maintenance, both from the standpoint of reducing costs, and also from that of rendering satisfactory, trouble-free service to the traveling public. The sum total of our maintenance experience finds expression in the new Chicago and Detroit garages. We believe these plants exemplify the latest developments in efficient, low cost maintenance practise. They represent an investment of more than $400,000, which amount we expect to write off in savings effected through more efficient maintenance practise.

Since these new garages are quite similar in layout, and follow the same service procedure, a description of the Chicago plant will suffice to give a clear picture of both.

The building has an average overall length of 533 ft., of which 404 ft. has a width of 113 ft.; the remaining 129 ft. is 93 ft. wide. The main garage is on the ground floor, while the unit repair and machine shop, occupying a space of 75 x 150 ft., is on the second floor. The drivers' assembly room, locker rooms, showers, etc., and the offices of the operating superintendent and his clerical force are also on this floor. The office of the chief dispatcher is located on the ground floor, but is reached from the second story by a stairway separated from the garage proper. This eliminates the necessity of drivers visiting the maintenance department except when they are taking coaches in or out.

* *General Superintendent of Maintenance, The Greyhound Lines, Chicago, Ill.*

The main floor of the garage occupies in excess of 56,000 sq. ft. and is utilized as shown in the following table:

	(Dimensions in Feet)	(Area in Sq. Ft.)
Storage	306 x 36	11,016
Driveways	326 x 35	11,416
Unit overhaul	131 x 32	4,192
Heavy overhauling	64 x 40	2,560
Inspection and minor repair	220 x 40	8,800
Stockrooms	130 x 35	4,550
Machine shop	20 x 45	900
Electrical shop	30 x 10	300
Wash rack	30 x 36	1,080
Grease pits	36 x 28	1,008
Steam-cleaning room	30 x 30	900
Mechanics' washroom	30 x 30	900
Office	(102 x 48) (13 x 16)	5,104
Miscellaneous		3,955
Total		56,681

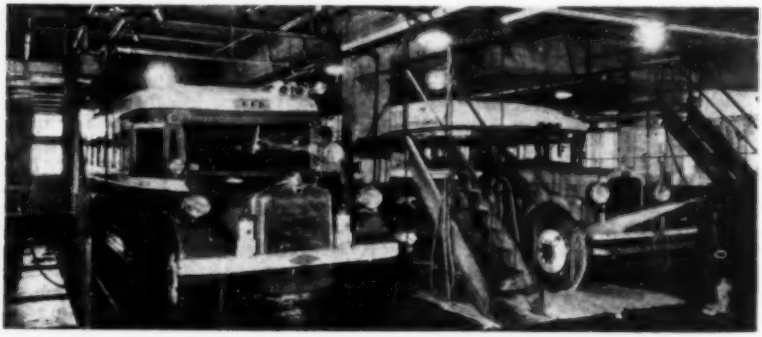
The straight line method of maintenance which we follow permits of the washing, inspection, greasing and complete servicing of equipment in an orderly fashion and with the least amount of waste motion.

Washing and Greasing

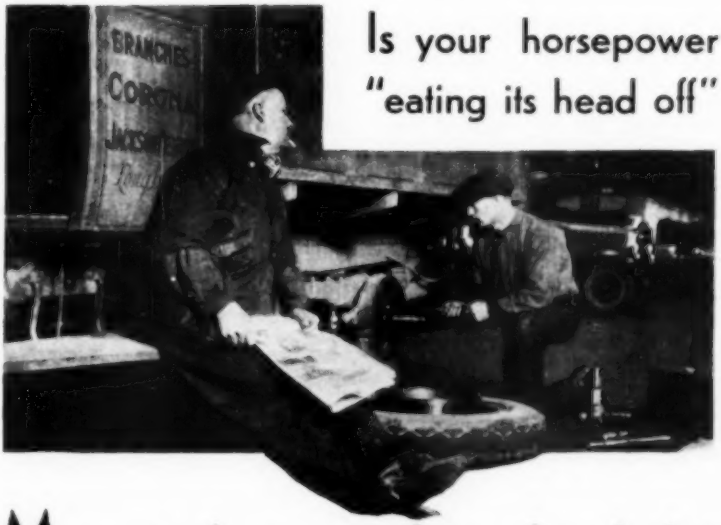
COACHES enter the garage one or two at a time through electrically operated doors, leading directly on to double wash racks. These racks are equipped with an overhead system of acorn sprays which completely deluge the coaches and rinse them in one minute. High-pressure washing guns, located along the sides of the racks, direct either a soapy mixture or clear water against the sides of the coaches by the simple manipulation of valves. Walkways are provided on top of the racks to permit access to the roofs. Steam jets are also provided to remove accumulated grease and oil from the engine and chassis. Coaches may be completely washed in less than four minutes.

After being washed, coaches are moved up to double grease pits, where they are greased, oiled and refueled. All greasing is done in the pits, while gas and oil are supplied from the floor level. Stocks of the three kinds of grease used are maintained in the basement and are fed to the pits under air pressure through steam-warmed pipes. Separate lines are supplied for the 600-W. chassis lubricant and fiber grease.

Oil tanks, oil reclamation equipment and gasoline storage are also in the basement. These consist of five 700-gal. oil tanks, an oil re-



The double wash-racks. Note the elevated platforms.



Is your horsepower "eating its head off"

Many truck owners have found that J-M Brake Blocks cut costly lay-ups

IN harness days the horse that ate its head off was proverbial, but the idle motor truck is a far more costly performer.

More than 650,000 safe, quick stops is an almost unbelievable record for any braking material. Yet J-M Brake Blocks have made records like this in 25,000 miles of service without changing the cam follower.

J-M Brake Blocks are adaptable to many types of equipment. Moulded from skilfully compounded asbestos, they resist the action of oils and greases. They reduce costs by giving thousands of miles of extra service, by reducing shop time for adjustments, by increasing tire life through smooth gripping and by eliminating road delays.

Many companies have tested this J-M heavy duty friction material with uniformly successful results.

Remember that Johns-Manville also makes the safe and long wearing woven, folded and moulded linings to meet the needs of every truck in your fleet. We will be pleased to send to any truck owner or superintendent a copy of the J-M Brake Re-liner's Manual—a complete treatise on brakes which you should have.

J-M Johns-Manville
BRAKE LINING FOR EVERY MOTOR VEHICLE

Address JOHNS-MANVILLE
At nearest office listed below
New York Chicago Cleveland
San Francisco Toronto
(Offices in all large cities)
Please send me a copy of, "The Brake Re-liner's Manual," BL-1.

Name.....

Address..... BL-129-3

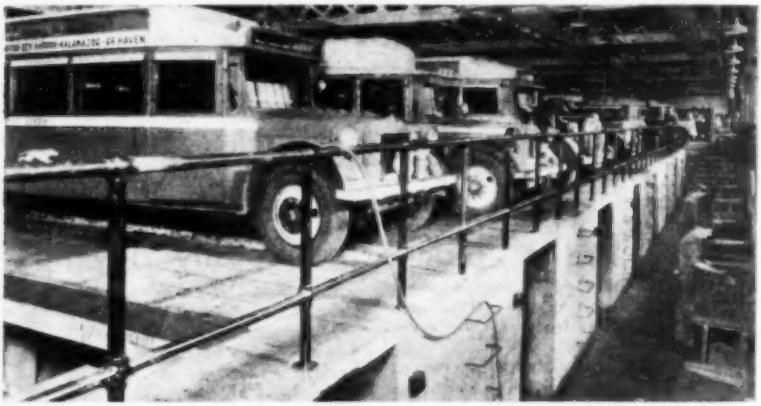
claimer with a capacity of 50 gal. every 24 hours, and a 20,000-gal. gasoline tank. The gasoline pumps and oil replenishing tanks are mounted on pedestals between the grease pits and are supplied from the tanks in the oil room by pumps.

While the coaches are on the grease pits the batteries are watered and the tires are checked. Both the tire and battery rooms are located just ahead of the grease pits so that all these steps of servicing are completed before the coach has moved 95 ft. into the garage.

ism, wheels and tires. The reports of the inspector and the driver are incorporated in the service report, so that when the coach reaches the service floor, full instructions are on hand for the foreman and mechanics.

The next move forward brings the vehicle to the brake testing machine, the use of which is part of the maintenance routine. This apparatus is built over a pit to facilitate brake adjustments. After undergoing the brake test, coaches proceed to the service floor.

Here are located a battery of



The eight service pits. Note the lateral passages, the conveniently located work benches and the accessibility.

Coaches Inspected When Greased

OUR rigid inspection takes place while the coaches are over the grease pits, and is one of the most important steps in our maintenance program. Having first examined the driver's report and noted the defects listed thereon, the inspector then goes over the coach, inside and out, noting the conditions of the seats, interior lights and upholstery, body, springs, motor, drive mechan-

eight service pits to care for repairs on chassis, springs, drive-lines, etc. There is also a space for six coaches requiring only engine repairs. Thus fourteen coaches may be handled at one time. The eight service pits are connected by a 6-ft. lateral passage on the same level. This permits the mechanics to have their work benches on the same level and to pass from one pit to another with ease. Each of these pits is

Dayton Truck Tires

are specially built for Specific Duties

NO manufacturer ever gave more thought to the building of a line of bus and truck tires that would meet every requirement of truck and bus operators. As a result these tires are practically custom-built. Bead and bead reinforcements are designed to give exactly the proper load distribution over the tire and to prevent bulging at the rim. The Dayton carcass is unbelievably tough—even after the tire has served its purpose the Dayton carcass is still live and snappy—and the *new* Dayton Dispersion Process for treads gives perfect and uniform distribution of *all* tread ingredients.

These are only a few of Dayton's unique and exclusive construction features—it will pay you to find out about all of them.

Your Dayton dealer has the right technical information necessary to fit the tire to your job and to your truck or bus—he has detailed illustrated information showing how Daytons are built. See him—let him show you why Daytons give such extraordinary service—why Daytons will give you those extra trouble-free miles that mean greater earnings and more profit for you.

Put Daytons on the wheels of your trucks and busses today.

The Dayton Rubber Mfg. Company
Dayton, Ohio

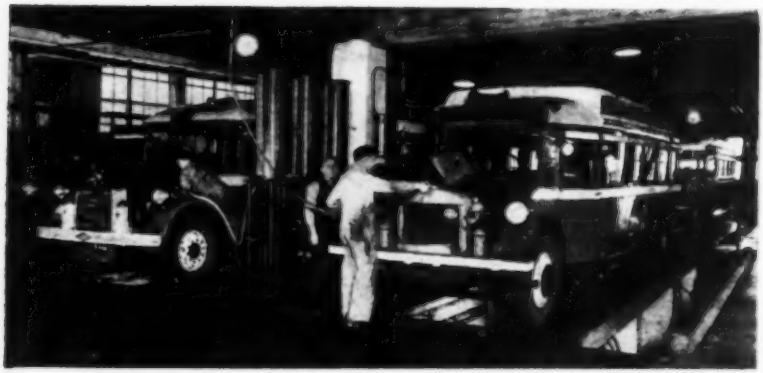
Dayton

Heavy Duty and Special Service Truck and Bus Tires

Two of the 1930 Dayton Line

Dayton Special Service Truck and Bus Tire

Dayton Heavy Duty Truck and Bus Balloon Tire



The double grease pits, where greasing, oiling and refueling is done. Note the three oil and grease tanks.

equipped with hydraulic jacks which will raise the front or rear of the coach a distance of 2½ ft. at the touch of a valve. The major overhaul department is located in the rear of the garage, so as not to interfere with the regular service routine.

No provision has been made in this building for body repairs, since it was impossible to design a building large enough for all purposes. All major body repairs are made in another building, which has been especially designed for the purpose.

When the coach has passed through the service floor, it is ready for the road tester, who takes it out for a short test run, noting any possible defects, particularly in those parts of the mechanism that were mentioned as faulty in the service report. Any newly discovered imperfections or uncorrected ones are recorded, and, if necessary, the coaches are brought back to the service floor for further adjustments.

As the last step in the service routine, the polishing and vacuum-cleaning apparatus is used to go over the floors, seats and upholstery of each coach. The windows and body are then polished so that the coach is spick and span when it goes out on the road. When this routine has been completed, the coach is lined up at the far end of the garage to await orders from the dispatcher.

Has Overhead Track System

A COMPLETE system of overhead tracks supporting small traveling hoists and span cranes covers the entire shop section, connecting through switches with the stock rooms and the elevators to the machine shops and unit repair rooms on the second floor. When units are removed from coaches, they are first cleaned with steam in a room provided for this purpose. From here they are then conveyed by overhead crane and elevator to the unit repair room on the second floor directly over the service department. When repairs have been completed, the units are returned to the first floor to the stock room, where they are placed in stock.

(*To be continued*)

467% Increase in 24 Months

in

DeLuxe Light Weight Cast Iron Piston

Standard Equipment Volume

When the officials of The DeLuxe Products Corporation of LaPorte, Indiana, drew up the balance sheet for the year 1929, they were highly gratified to note that their standard equipment business had increased 467% in a two-year period.

Representative manufacturers of automobiles, fire engines, trucks, tractors, taxi cabs, marine engines, and motors for all purposes, one after another have adopted DeLuxe pistons for their standard equipment jobs.

THE NEW IMPROVED DELUXE

The piston which has been accepted by these manufacturers as right for their factory-built jobs, is just as right for replacement jobs. More and more fleets throughout the country are recognizing this fact and are demanding DeLuxe pistons for all their overhaul jobs.

The discerning distributor will tie up open territory with a DeLuxe franchise early this year.

THE DE LUXE PRODUCTS CORP.
1810 Lake Street
LaPorte, Indiana

How to Time

VALVES *and* IGNITION

This Article Should Appeal to the Many Users of Vehicle Fleets That Are Powered by Continental

IN response to the many requests from readers of this publication, both over the telephone and by mail, for information on valve and ignition timing of *Continental* engines, this article is published. Being authorized by the engine manufacturer, its correctness can be unreservedly accepted, a similar treatise having first been published in the *Red Seal*, official journal of the Continental Motors Corporation.

The proper setting of the valves with relation to the crankshaft (valve timing) is one of the most important phases of successful motor operation. Because of the enormous number of *Continental* engines in universal use today and the fact that practically every fleet repairman is more than frequently engaged rebuilding, repairing or adjusting engines of this make in passenger cars, trucks, busses and tractors, a special article on this one make is deemed in order.

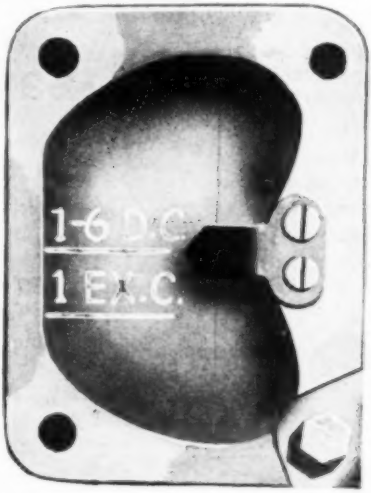
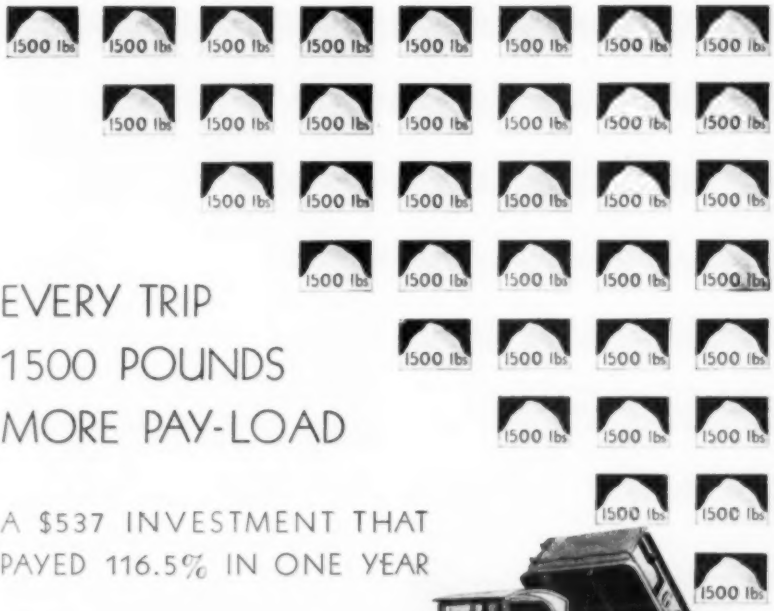


Fig. 1—Typical Valve Timing Markings on Continental Engine flywheels

While the reference data and timing marks are exclusively *Continental*, the information carries with it certain practice and procedure which might be successfully applied to any automotive engine.

In all *Continental* engines, the recommended timing of valves is the result of exhaustive tests. Therefore, the fleet mechanic should never attempt to alter the original factory setting. Some mechanics often believe that they can better the performance of an engine by changing the timing. This is a fallacy, as nothing but harm would be accomplished through such a move.

While tabulated data showing the opening and closing of exhaust and intake valves in degrees is quite interesting, and is very frequently used for checking and setting the camshaft, the more practical



EVERY TRIP 1500 POUNDS MORE PAY-LOAD

A $537 INVESTMENT THAT PAYED 116.5% IN ONE YEAR

A Pennsylvania trucking company decided to try an Alcoa Aluminum body on a 6½ ton Mack Truck, for hauling sand. The body and hoist, when built of the light, strong Alloys of Alcoa Aluminum, weighed 1,500 lbs. less than the old-style steel construction.

With its old-fashioned steel body, this truck hauled 12,000 lbs. With its new Alcoa Aluminum body, it was possible to pile on 13,500 lbs.—1,500 lbs. more pay-load—1,500 lbs. less dead-load.

There was an added initial cost of $537, over the steel, for the Alcoa Aluminum body and hoist. But the extra 1,500 lbs. of pay-load carried each trip brought added profits. In a year's time, these showed a return of 116.5% on the $537.

A representative from our nearest office will be glad to talk with you about the use of Alcoa Aluminum Truck Bodies. ALUMINUM COMPANY OF AMERICA; 2461 Oliver Building, PITTSBURGH, PA. Offices in 19 Principal American Cities.

ALCOA

ALCOA ALUMINUM

method is to be governed by the flywheel markings and tappet clearances which will be described in the following paragraph.

To take advantage of these instructions, a study should be made of the flywheel rim markings as shown in figures 1 and 2. The mark *D. C.* when under the flywheel pointer indicates that number one piston is at top dead center, and is about to descend on the intake stroke. When the marking *EX. C.* is just beneath the flywheel pointer, the exhaust valve should have just closed. This should be the case when the tappet adjusting screw shall have been adjusted to permit of between .006 in. and .008 in. clearance between the screw head and the lower end of the valve stem.

Because of manufacturing tolerances "building up" in one direction in the case of gear driven front ends, it may be that the cam and

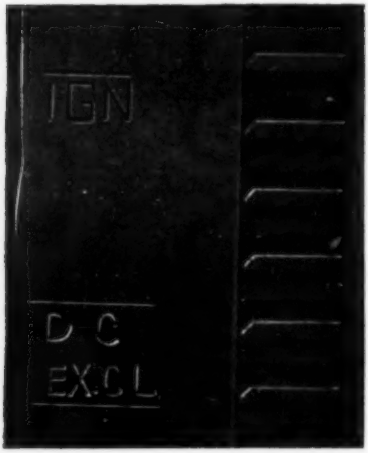


Fig. 2—Markings showing ignition setting, dead center and exhaust valve closing position.

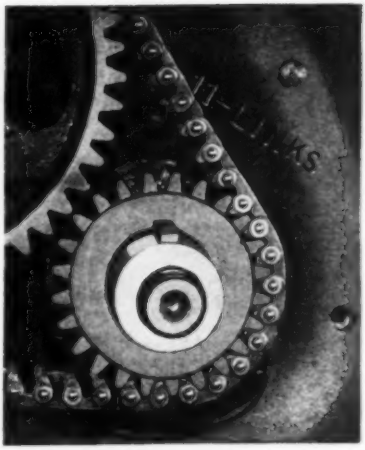


Fig. 3—Showing number of links stamped on sheet-steel chain case.

idler gears will not mesh together exactly, that is a tooth on one gear will not be exactly opposite a space in the other. The mechanic should always bear in mind, of course, that the cam gear will turn slightly to the right or to the left (as the case might be) due to the angular pitch of the teeth (in the case of helical cut gears). This turning may be just enough so that when fully in mesh, the cam will be in exactly the correct position for proper "timing."

In case this "spiral wind" does not compensate for manufacturing tolerances, advance the cam gear the fractional tooth width necessary for correct meshing. Under no circumstances should the camshaft be retarded (turned to the left) in order to effect the proper meshing.

Another simple method of checking and correcting valve timing, in the case of the chain driven front end, is as follows: After the chain

The Ideal CLUTCH DISC *for Fleet Owners*

FLEET owners know that clutch discs get hard treatment. Some drivers are in the habit of "riding the clutch" and others let it out with a jerk. That's the reason why many ordinary clutch discs have to be renewed every six months or sooner—a costly job of tearing out the entire clutch plus the loss of the car or truck while laid up for repairs.

Hoof Guay Interwoven Clutch Discs are made, by a patented process, of ⅛" strands of asbestos rope so interwoven that they become interlocking. They are strong and durable and out-wear and out-hold any style of clutch plate. No wire used—no rivets required to secure to metal plate. They do not slip, grab or chatter. Easy to install—last the life of the truck or car in which installation is made.

Clutch Discs for Ford, Chevrolet, Brown-Lipe and all cars and trucks

A letter will bring to you a complete catalog of service parts for various cars. Just address your request to—

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case cover has been removed it will be found that the camshaft sprocket and crankshaft have certain timing marks stamped as indicated at "A" and "B" in figure 4.

Upon also examining the chain case as illustrated in figure 3, it will be found that in the case of the casting, the number of links to be placed between the timing marks is cast into the chain case (in the case of the sheet steel chain case, the number of links is stamped). For example the chain case Fig. 4 specifies 13 links. This means 13 links or 14 chain teeth between the marked spacers on the camshaft and crankshaft sprockets, including the two teeth that are indexed in the marked slots.

Frequently mechanics write to our trouble shooters' department requesting certain valve setting as measured by travel of the piston. This has been worked out several times and found to be impractical to use unless you use the motor gauge. This is because near the top and bottom ends of the stroke with the piston vertical, the crankshaft angular movements are relatively small; so small that the difference between the top dead center and the usual point at which the inlet valve opens can scarcely be noticed by the naked eye. A micrometer depth gauge would be required for measurement. (*Such a gauge is now available in practical form. Details on request.*)

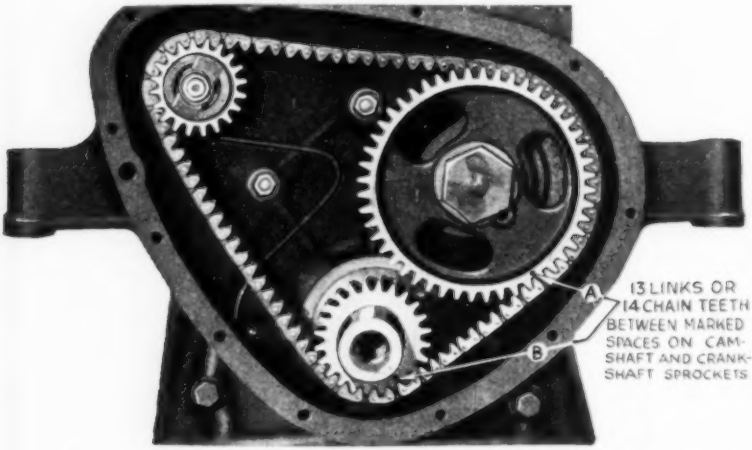

Fig. 4—How the timing marks are stamped on the sprockets.

Timing the Ignition

THE subject of ignition timing of *Continental* engines can only be dealt with briefly because of the many different types of magneto and battery ignition systems used on the various models by the car manufacturers.

All vehicle and industrial manufac-

(*Please turn to page 24*)

The Replacement Line that's Genuine!

And Why -

With every research and test facility at hand, the largest automotive manufacturers use Federal-Mogul parts. All told, over 150 automotive manufacturers use them continuously. That's what makes Federal-Mogul the line that's genuine. Could there be better proof that this, by all odds, is the line for repair and replacement?

Modern production facilities that are serving leading automotive manufacturers with Federal-Mogul Bearings, Bushings and Bearing Metals are likewise serving the replacement field.

If you are not already using "The Replacement Line That's Genuine", make use of this better service—invest in satisfactory performance that conforms to the standards set down by the manufacturer of your busses and trucks.

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DETROIT MICHIGAN

Over 150 Automotive Manufacturers Specify Federal-Mogul Products as Standard Equipment!

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Laminum Shims
Federal-Mogul Bronze Back, Babbitt-Lined, and Die-Cast Connecting Rod and Main Bearings (Standard and Undersize) Piston Pin Bushings. Connecting Rod Bolts and Nuts. Bearing Anchor Screws. Bronze Bars and Babbitt Metals. Shoemaker Rebabbitting and Line Boring Equipment.

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Santa Fe Building 1128 Jackson St. Dallas, Texas
Detroit, Michigan
11 Davenport Road Toronto, Canada

Valve and Ignition Timing

(*Continued from page 22*)

turers include, with their instructions, data issued by the ignition unit manufacturers. These data give specific instructions for the setting of their particular make and type of system. Conditions and requirements may vary so that just the correct setting can only be determined by the individual tests.

A variable ignition type of magneto and battery system distributor will both require the same setting for the best performance at maximum loads. First determine just how your flywheel rim is marked.

If as illustrated in Fig. 1, then turn the crankshaft until the point *D. C.* is just opposite the flywheel pointer. Next the breaker box (in the case of magneto or distributor) body should be set in a fully retarded position. Finally, the cam of the magneto or distributor is to be set so that it has just begun to separate the breaker points.

Fig. 5—Note the number of links cast into this case.

If your flywheel marking is as illustrated in Fig. 2, instead of turning the crankshaft until the *D. C.* mark is just under the pointer, the crankshaft should be turned until the mark *IGN* is just under the flywheel pointer. Then set the magneto or distributor as outlined heretofore.

There may be an occasional instance where the magneto (variable type) will require a slightly greater advance. This is seldom the case although the average maximum advance of the magneto is but 20 deg., while the battery type of distributor is frequently 30 deg. or more.

Where a magneto of the fixed or set ignition type is used, the timing will vary somewhat from that described in the foregoing paragraphs. It will vary more or less in each individual installation with the piston on top dead center. The cam and armature will require an advance of from 15 to 30 degrees which amounts to from ⅛ to 5/16 of an inch of piston travel, measured just before the piston reaches top dead center on the compression stroke.

It is quite necessary to use an impulse coupling with such extreme advance settings. One caution will apply here, regardless of what make of impulse is used, and this is to make sure that the coupling has tripped before setting the armature or cam.

Opens New Warehouse

A NEW warehouse has been opened at 236 15th Street, Los Angeles, by John C. Hoof Company, to service Southern California distributors. Complete stocks of timing gears, valve lifters, tappets, silencers, guides, clutch discs and governors will be maintained. This is the fifth warehouse opened to date by the Hoof Company.

How
"LOW"
are your
COSTS PER MILE?

You know that *mileage* is the only way to measure tire value. *Cost per mile* is the only figure that counts.

But even when you get your costs per mile, how are you going to know whether they're high or low?

That's where we can help. We know just what service tires should give under all operating conditions. We can tell *you* just what tire mileage, and what *cost per mile* you should expect on your own trucks.

Why not get an expert analysis of your truck operations, without cost or obligation? Write, today, to the Fisk Transportation Engineering Department and find out where you stand on tires.

mileage

FISK

THE FISK TIRE CO., INC.
CHICOPEE FALLS, MASS.

Delivering Fuel-Oil *Quickly!*

How Fleet Owner Speeds Up Deliveries of Heavy Fuel-Oil by Use of Heating Coils in His Tanks

By F. J. Fitzgerald

IN our February issue we illustrated and described a home-made outlet pipe being used on tank trucks for the rapid delivery of fuel-oil for domestic and industrial use. One of these, mounted on a tank truck, is shown at the left of the picture above.

Competition is keen in this line of business today and those merchants that can back up their products with "service" usually get the business. Not only in the oil distribution business does this apply, but in all other lines as well.

The buyer of fuel-oil, whether he be the proprietor of a wayside filling station, the owner of a factory, or a small domestic user of furnace oil, demands service. This means delivery on time, all of the time, and under all weather conditions, regardless of any unforeseen circumstances.

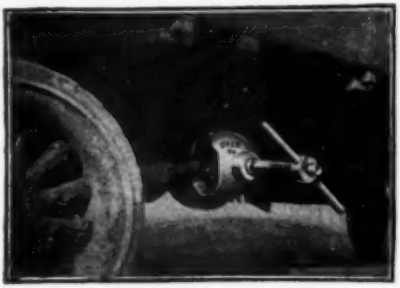
The large oil companies realize this and consequently when distribution stations for their products are established they are careful to see that the distributor in charge has adequate storage facilities and the proper equipment to make speedy delivery.

These oil distributors in most cases work without holiday. Their trucks are on the road constantly, day and night.

One of the problems in connection with quick delivery is encountered in the handling of heavy 16-20 fuel oil during cold weather. Usually this oil is drawn from barge or

For MACK Trucks of All Models—Use

GREB
MACK SPROCKET PULLER No. 70



This is a one man Tool, adaptable to all sizes of sprockets on all models of Mack Trucks.

Made of high grade Steel. Is complete with bar wrench

Price $45.00

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If your distributor cannot supply you, send us your order. Try it for 10 days. If YOU are not satisfied return it to us and we will refund the money.

The harder the Pull, the Tighter they Grip

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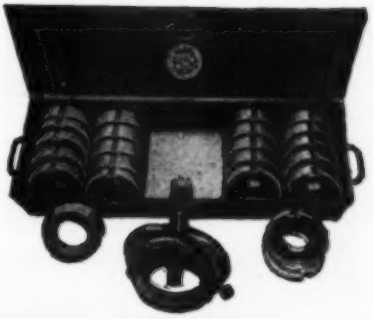
HUB WHEEL PULLERS No. 64

GREB Universal Hub Wheel Puller Kits render complete wheel removing service and Fit 98% of the Cars and Trucks manufactured.

Positive Pullers for removing the toughest Wheels without breaking gears or injuring threads



Price
Puller $12.00
Adaptors $2.00 each

The GREB Co.

310 STATE STREET **BOSTON, MASS.**

tank car and is stored by the distributor in the large tanks, generally of about 40,000 gal. capacity. In cold or freezing weather this heavy oil congeals and when drawn from the tank for delivery by auto truck the delay at the loading platform is always a source of considerable annoyance. Consequently a progressive Eastern distributor for a large oil company has installed heating coils in his storage tank in order to speed the loading operation. The motor trucks which haul this heavy oil also contain heating systems built into the trucks.

Due to the approach of cold weather, the distributor was anxious to install heating coils as quickly as possible in a new storage tank that had just been erected. This problem was splendidly handled by his welding shop.

Because the only opening in the tank was a manhole only 2 ft. in diameter, it was necessary to fabricate the coils in sections of suitable size at the shop and then assemble them inside the tank. Ten sections, each consisting of 20-ft. lengths of 3-in. pipe connected by three welded return bends, were fabricated in the shop and brought to the point of installation.

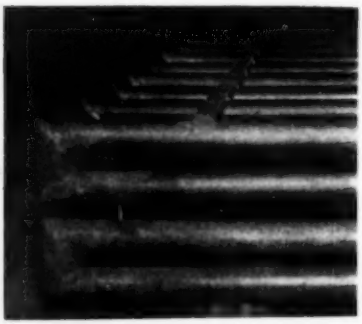


Figure 1—Note the transverse strap to hold the coils rigid

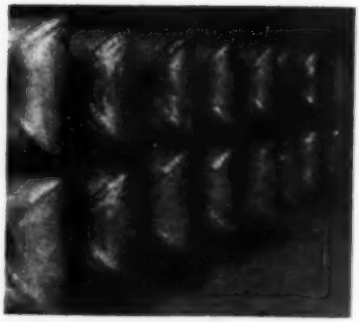


Figure 2—The return bends were oxwelded as shown

As the storage tank was new and had never contained oil, the welding together of these sections inside the tank required no special precautions other than the provision of an adequate supply of fresh air.

Welding inside of a tank that has contained oil, however, should never be attempted unless every possible safety precaution has been taken. Even after the tank has been thoroughly steamed out, it is advisable to use a combustible gas indicator in order to make certain that the atmosphere at every point within the tank is safe before attempting hot work of any kind or any operation that might produce sparks.

After lowering the sections of the coil through the manhole in the roof of the tank, they were assembled in correct position and the open ends of each section were welded to the flow and return headers. Figure 1 shows the opposite end of the completed coil, showing the method of maintaining proper spacing in the coil by means of a transverse strap

(*Continued on page* 64)

OVERCHARGING
buckles battery plates . .
Buckled plates puncture insulation
but not in a fortified Willard

When a storage battery gets overcharged, heat is generated in its cells. Persistent overheating buckles its plates and raises high spots on them.

These high spots often wear holes through the insulation in wood-insulated batteries. Then they must either be re-insulated or replaced.

In Willard Thread-Rubber Batteries a more durable insulating material is used. It has hard rubber ribs to defy wear, and contains no wood whatever.

Willard STORAGE BATTERIES

CLEVELAND·OHIO

See these MODERN TRUCKS

in the
Great Display of
GENERAL MOTORS TRUCKS
for 1930

THERE'S a mighty important profit angle for you in the great display of General Motors Trucks for 1930, starting Saturday, March 8, in branch and distributor showrooms throughout the United States.

You'll see representative models for your work in the most complete line of modern trucks the industry has ever seen. It starts in the ½ ton range and goes up—without a gap—to the 15 ton tractor range.

It is a line that includes 11 Basic Models . . . 33 chassis . . . 118 different types. Offering a range of choice so wide that—*from a practical standpoint—it amounts to trucks made to order for your work.* At prices which plainly pass on to truck-users the big benefits and savings of volume production and volume purchasing.

THE MOST PROFITABLE USE YOU CAN MAKE OF YOUR TIME IS TO SEE AND GET FULL FACTS ABOUT THESE MODERN TRUCKS.

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TIME PAYMENTS, on any General Motors Truck, are financed at lowest rates available anywhere, through our own Yellow Manufacturing Acceptance Corp.

GENERAL MOTORS TRUCK CO., Pontiac, Michigan (*Subsidiary of* Yellow Truck & Coach Mfg. Company). GENERAL MOTORS TRUCKS, YELLOW CABS, COACHES.

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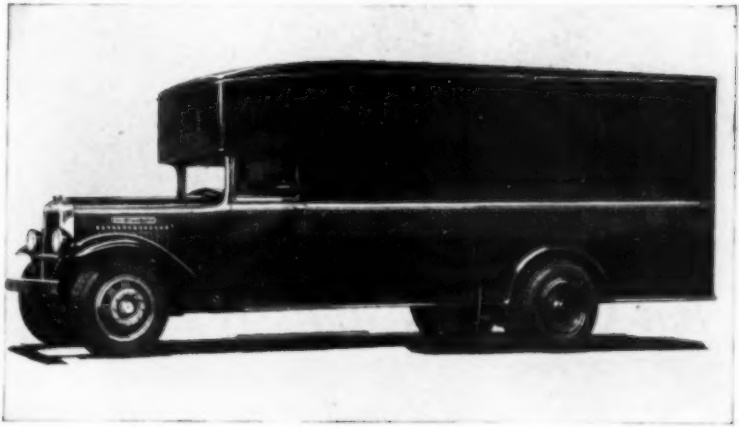

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MODEL T-82 C
4-TON RANGE

This rugged model comes in four wheelbases—155", 167½", 185¼" and 201" and 12 different tire combinations. Chassis prices vary according to wheelbase and tire equipment. Straight Rating—22,000 lbs.—total gross weight including load.

Standard gear ratio 10.33 to 1. Optional (without extra charge); 9.00 to 1; 12.33 to 1. Five speeds forward, two in reverse.

(Price Chassis Only, F.O.B. Pontiac, Mich.)

THIS BIG, powerful unit thrives on tough, hard duty. There is brute strength throughout its construction. The smooth, 6-cylinder engine has a tremendous power-output that moves heavy tonnage at day-long high speed. Put it into trans-continental hauling, with two drivers alternating, and it will turn in from 350 to 500 miles daily.

SEE AND INVESTIGATE THIS GREAT PERFORMER—NOW!

MOTORS TRUCKS

What Colors *Shall We* Use?

Some Hints on Choosing Attractive and Suitable Color Combinations for Motor Trucks and Busses

By H. Ledyard Towle*

THERE is no good reason why delivery vehicles should all be painted black any more than there is why all busses should be painted white. We are coming rapidly to know that a light colored business vehicle or truck can express not only the name of the business and the proprietor in letters on its side but can also have a real and constant selling appeal as it goes through the streets, because of the colors used in its finish.

In fact, the lettering on business vehicles and busses is a subject worthy of much consideration by itself. If you want your vehicles to look long, efficient and powerful, avoid these tall up-and-down glaring letters as you would the plague. They may be visible a block away, though often, because of their eccentric design they are scarcely readable even at ten feet. But, even if they are visible, they often destroy more than they create by making the vehicles look either eccentric or squat and dumpy.

The same applies to a bus. I have seen several beautiful busses refinished with some skill in color that have been literally spoiled by the ungracious flamboyance of their signs. The signs on a business conveyance must be as harmonious as the rest of its line and color or else it undoes the whole effect.

Different sorts of business of course demand different color com-

(*Please turn to page* 64)

* *Duco Color Advisory Service.*

Made for Every Type of Passenger Car, Bus, Truck and Taxicab in Operation

Lempco Shafts are carried in stock for immediate delivery by good jobbers everywhere. Write for the name of the nearest Lempco jobber.

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This ONE LINE meets All

THERE is a correct type of Multibestos brake lining for every standard make of passenger car, bus and truck. With this one line it is possible to meet all replacement needs. And there is no better quality anywhere, today, than that built into every Multibestos product.

COMPLETE!

A Complete Line—Multibestos

- Multibestos Regular Brake Lining
- Multibestos Busduty Brake Lining
- Multibestos Moulded Brake Liners
- Multibestos Clutch Facings
- Multibestos Transmission Linings for Ford Cars and Trucks
- Multibestos Brake Service Station Equipment

A Complete Service—Multibestos

- Multibestos Multigraphed Dealer Letters
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A complete line of the highest quality products, reinforced by a complete service, produced by an alert company of unquestioned responsibility and standing.

Multibestos Moulded Brake Liners. Surface ground. Developed specially for installation on internal expanding type brakes.

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Multibestos Regular Brake Lining. Widely used as original factory equipment. It is pre-heated and woven with the famous interlocking weave.
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Multibestos Busduty Brake Lining. The heavy duty lining used by many of America's leading cars, busses and trucks.
LTIBESTOS
SAFE BRAKE LINING

Some *of the* Answers *to* Question No. One

We wish to express our thanks to those of our readers who have so willingly responded to our new "Question-of-the-Month Club." It is not possible to publish all the answers received, but a few of the most interesting ones follow. Question Number 2 appears on the page opposite. We again urge our readers to join us in this movement. All replies will be kept in our files and the most interesting ones published—unless you specify that your experiences shall not be made broadcast. In that event they will be held strictly confidential. Please tear out page 37, fill it in and mail to the Editor. Do it now, before you forget it.—The Editor.

"We use straight-run gasoline in our fleet of 22 trucks and five passenger cars, because we think it gives more mileage, dollar for dollar. The trucks do 7 miles per gallon and the passenger cars 14. During a month the trucks each average about 600 to 1000 miles, while the passenger cars do about 800."—*D. P. Canston, Mgr., Rochester Ice & Fuel Co., Rochester, Minn.*

"Our trucks seem to operate satisfactory on the straight-run gasoline. We have 50 of them, and two passenger cars, and we cannot see the need of buying a more expensive gas. During the month each truck does about 2000 miles."—*J. J. Vaughn, Mgr., Frisbie Pie Co., 357 Kossuth St., Bridgeport, Conn.*

"We use in our fleet of 23 Mack AC trucks straight-run gasoline made by The Triangle Oil Co., known as Top Notch Gasoline. It gives us a mileage of 2½ to the gallon. We operate about 1250 miles per vehicle per month."—*L. E. La Padd, Superintendent, McClure Teaming Co., 2019 Fullerton Ave., Chicago, Ill.*

"We use straight-run gasoline in our fleet of 15 trucks and two passenger cars, because we find that the cost is less, considering the price between straight-run gasoline and other kinds which usually have a higher cost of about 3 cents per gallon. In the course of a month our trucks run about 2,850 miles each, and the passenger cars about 1800. On the trucks we get about 3 miles per gallon and about 12 on the passenger cars. Our trucks seem to operate on one fuel as efficiently as they do on any other fuel."—*J. W. Owen, 348 Piomingo St., Memphis, Tenn.*

"In our fleet of 16 trucks we have had best results, dollar for dollar, from Texaco straight gas, getting an average of about six miles per gallon. During the month, each truck does about 1200 miles. We use straight-run gas exclusively."—*H. C. Branch, Mgr., Truck Transfer Co., Inc., Bristol, Tenn.*

"Straight run gasoline is used in our fleet of 45 trucks and 40 passenger cars, because we think that this grade is best for all around work and gives less trouble. Our average mileage per gallon is from 3½ to 12 on the trucks and from 10 to 20 on the passenger cars. The trucks do about 1500 miles each per month, and the passenger cars average about 2000. In my own car I use ten gallons of high test gasoline to every fifty gallons of straight-run gas. This helps to keep the carbon down."—*C. Haines, foreman, The Penn Dairies, Inc., North Queen Street, Lancaster, Pa.*

Question-*of*-*the*-Month Club

Question Number 2 — BRAKES

What type of brake lining do you use? (Woven, Molded, Block, etc.)

On Internal Brakes?..... External Brakes?.....

Have you found a lining that can be successfully used on all types of brakes? (State make and type) .....

What combination of brake lining and brake drums gives you best results?

.....

How often are the brakes adjusted?.....

Average mileage between brake relining jobs?.....

Average mileage per set of drums?.....

About how many feet of lining do you use per month?.....

Have you a lathe that can true brake drums?.....

Special Remarks .....

.....

.....

.....

How many vehicles in your Fleet?

.....Trucks; .....Busses; .....Pass. Cars; .....Taxis

Name of Firm .....

Address .....

City and State .....

Your Name ..... Position .....

(Please tear out and mail to the Editor, The Fleet Owner, 90 West Street, New York.)

Two New Models *by* G.M.C.

"Custom Delivery" in Town Car and Sedan Types—New Model T-15 is ¾-Ton Light Duty Vehicle

TWO new lines of motor trucks were recently announced by General Motors Truck Company, Pontiac, Mich., in the form of a "Custom Delivery" that comes in both sedan and town-car types with panel bodies, and the Model T-15, a truck in the ¾-ton range.

The Custom Delivery will appeal to establishments such as exclusive stores, florists, specialty shops and high class institutions. The "town-car" type is pictured here. Both types in the Custom Delivery line are built on the same chassis.

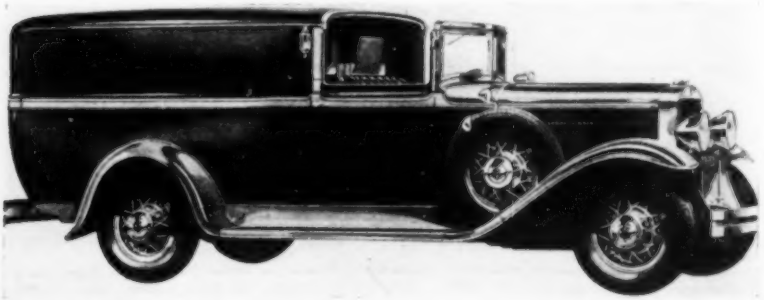
The long, low sweeping effect can be easily noticed, as well as the close resemblance to the fine type of passenger car in the higher-priced brackets. The wheelbase is 122 inches and the turning radius is 19' 8".

Loading space for even bulky merchandise is provided in the bodies, into which are incorporated wood, leather, steel and other metals. The inside length is 86" in the sedan type and 81" in the town car. In both types the inside heights and inside widths are 46½" and 51½" respectively. The floors are ¾" thick, varnished oak. The rear doors are hung on three hinges and open to a width of 35".

Springs are of the semi-elliptic type, mounted in rubber at both ends and controlled by Lovejoy shock absorbers of the double-acting type. Four-wheel brakes of the Bendix two-shoe type are used. Two spare wheels are mounted in fender-wells on each of the fenders. Either disc wheels or wire wheels may be had, finished in chromium. All exposed metal is likewise finished in chromium plate.

Further particulars describing this line of deluxe cars may be obtained by writing the above company, or to the Editor of this publication. An interesting booklet has been prepared and is ready for free distribution.

The new Model T-15 is a light-



SAVES TIME AND TROUBLE

Vellumoid Gaskets are awlays ready for use.

They do not shrink, stretch nor crack—they make tight joints which stay tight.

No shellac is required, gaskets are easy on and easy off.

VELLUMOID
THE REAL REPLACEMENT GASKET MATERIAL

The Vellumoid Co., Worcester, Mass.

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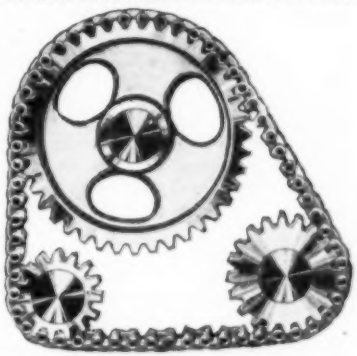
You have a question to ask.
You want service information.
You want to buy something.
You want to sell something.
You want the price of anything.
You want the maker's name.
You are in doubt about anything.

Just Write to the

EDITOR

We Are Here to Serve You



Why . . . .

DUCKWORTH TIMING CHAINS *last longer!*

Duckworth Chains are constructed of the right steel. Links are sturdy . . . with patented arched backs to give added strength. The hollow split pins absorb shocks, provide self-oiling and eliminate stretching due to worn link holes. Ground surfaces, accurately gauged for precision, give smooth uniform performance.

Rigid factory tests of every individual chain protect Duckworth users.

Use Duckworths on your next timing chain replacement job. They're *easy* to install—and *hard* to wear out.

Write for booklet, "Timing Chains, Their Construction, Use and Installation," giving specifications and prices on all cars and trucks.

DUCKWORTH CHAIN & MFG. CO.
Springfield Massachusetts

duty unit offered at a low first-cost with a rating in the ¾-ton range. It comes in two wheelbases. The T-15a chassis has a 130" wheelbase and takes a 7½-foot body, while the T-15b chassis has a 141" wheelbase and takes a 9-foot body.

Interesting features are the good-looking, factory-built bodies, the smart and roomy driver's cab and the long and low lines of the entire unit. Under the hood is the six-cylinder, light duty power plant, already familiar to many of our readers, with its bore and stroke of 3 5/16" x 3⅞", developing 58 h.p. at 3,000 r.p.m.

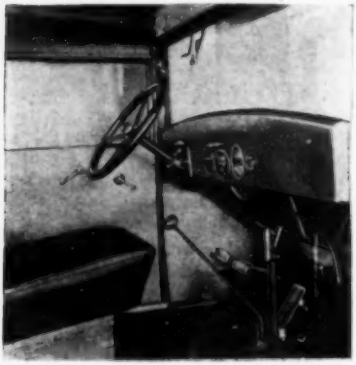
The frame is of 3/16" pressed steel, with a 6" channel and a 2¼" flange width. Five cross members, including the engine support, are used. Brakes are also of the Bendix 2-shoe, internal-expanding, four-wheel type. Regular equipment includes artillery type wood wheels, but disc or wire wheels can be obtained at extra cost.

A single-plate clutch is used, of the dry type, in conjunction with a conventional type of 3-speed transmission. Front axle is a drop-forged I-beam of the reverse-Elliot type, using Timken roller bearings in the wheels. Rear axle of the banjo type uses spiral bevel gears, with a standard ratio of 4.86 to 1 and an optional one of 5.86 to 1.

The steering gear is also of interest, being one of the "roller bearing worm type." A three-toothed sector that is said to eliminate shimmy, makes constant contact with the worm in any steering position. Roller bearings are provided at the top and bottom of the worm. The steering post is adjustable.

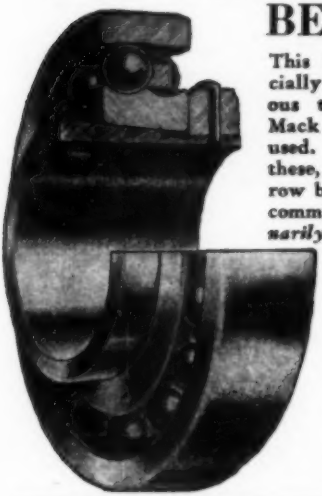
Fenders are of the full crown type, front and rear, connected by a full-length running board.

These are only condensed specifications. If you are interested in anything in this line, the Editor will be glad to send you a free set of literature on request; if you prefer, you can write directly to General Motors Truck Company, Pontiac, Mich., mentioning the fact that you saw it in the FLEET OWNER.



Left: Roomy driver's compartment in the new GMC T-15 truck. Right: Looking into the body from the rear. Rear doors are wide.

SELF-ALIGNING BALL BEARINGS



This type bearing is used especially on Propeller shafts in various trucks. In the clutch of Mack Trucks size No. 2215 is used. Stock and Service on all these, as well as on regular single row ball bearings, at your instant command. Prices are *extraordinarily* attractive.

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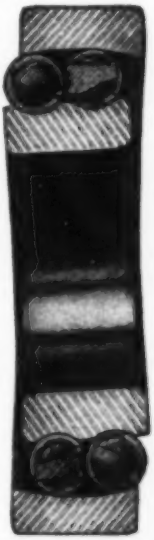

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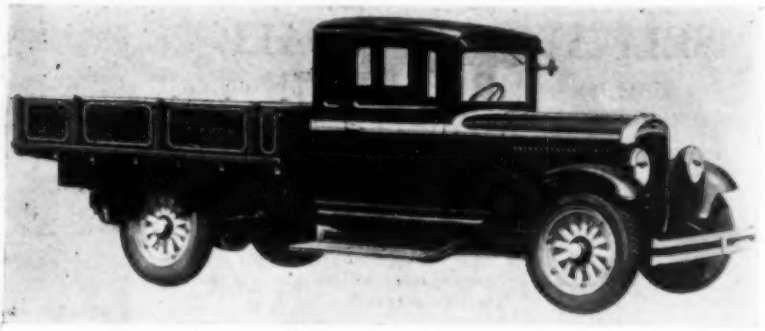


The popular 4-cylinder, one-ton model, recently announced

DODGE *offers* Complete *Line*

Large Variety of Models Meets Nearly Every Requirement — Interesting Exhibit at Recent Road Show

FOUR-CYLINDER models in three capacities and six-cylinder models in five capacities with a variety of wheelbase lengths applicable to the entire line constituted the representative display of Dodge Brothers trucks and commercial cars for 1930 at recent automobile shows and in dealer's showrooms.

Practically all features of advanced engineering design that have made passenger cars more efficient, economical, safe and dependable have been incorporated in Dodge Brothers commercial cars. Sizes run from the ½-ton, four-cylinder Merchants Express of 109-inch wheelbase to the heavy-duty, three-ton, six-cylinder model of 185-inch wheelbase. Various adaptations of this wide range of units meet 96 per cent of all transportation requirements, it is stated.

All models are equipped with hydraulic internal-expanding four-wheel brakes. Brakes are completely enclosed as a protection against dirt and dust, and to afford positive control in all types of service. Radiator shutters operated from the dash are standard equipment on all heavy-duty models. A four-speed transmission in the one-ton and heavier capacity trucks insures a more flexible range of road speed and pulling ability, longer engine life and economy.

Engines used in all capacities except the half-ton, two and three-ton units have a bore of 3⅜, a stroke of 3⅞ inches and a total piston displacement of 208 cubic inches. Engines in the two heavier capacities have a bore and stroke of 3¾ by 4½ inches, and displacement of 241.45 cubic inches. All six-cylinder types have seven-bearing crankshafts, statically and dynamically balanced, insuring smoothness at all

(*Please turn to page* 65)

K-D

is the way to say **OK** *in*

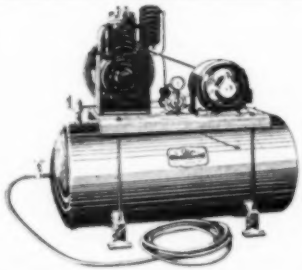
VALVE SPRING LIFTERS

The new **No. 380** *Lifter*

will service the new low port opening motors. It is stronger than other makes of lifters. Equipped with automatic over-center lock, adjustable plunger bar and an extra straight jaw. The compressor is easily operated with one hand. There's a K-D Valve Lifter to fit every job.

K-D MFG. CO., LANCASTER, PENNA.

Try and match this unit for $215.



2 H.P. Motor, 60 gallon tank. Timken bearing equipped, with ample air for operating lifts, painting and all tire inflating.

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QUIET
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You Can't Buy Better Gears than

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How MACY *Reduced* Accidents

Scientific Selection and Individual Training of Drivers Results in an Actual 75% Accident Reduction in Three Years

R. H. MACY and Company, Inc., New York City, has over a period of three years developed a system of drivers' training which has cut their accidents to one-fourth.

Their work in this direction has been a gradual development with results as follows:

1. Before training—sixteen accidents per 1,000 vehicle days.*
2. During mass training—twelve accidents per 1,000 vehicle days.
3. Salary reviews and personal conferences — seven accidents per 1,000 vehicle days.
4. After individual training plus special tests—four accidents per 1,000 vehicle days.

The four series of figures just given indicate the degrees of progress under gradual improvement of the system.

When the index rate was as high as sixteen the store undertook a campaign of drivers' training which may be called "mass training" as compared with training individuals singly or in small groups. For example, under the mass system it was customary to call the drivers together as an entire group at the beginning of the day and give them lectures. In connection with this there were also a bonus system, posters and other literature.

While the attention given to the subject in that way evidently had some result, it was decided after eight months that this did not get maximum efficiency. It did not differentiate between the skilled drivers and the unskilled and the lectures took the time of the drivers at an hour of the day which was unsatisfactory to all concerned. Mass lecturing did not get the individual attention and was not favorably received by the men.

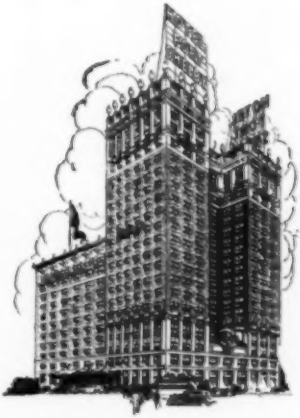
Bonus System Versus Salary Review

THE bonus system which was adopted provided for a five dollar reward for every thirty days of no-accident driving. This has been advocated as an improvement over the monthly bonus system because the latter gives no incentive to a man if he has an accident during the early part of the month. The plan adopted, however, proved to be wasteful primarily because the period covered was too short. A driver for example might collect several bonuses, then have three or four accidents in one month, resulting in dismissal. In that case the firm would have paid out a high salary rate for several months to a man who did not deserve it. Furthermore, the net effect was to minimize

* *These figures covering the Macy fleet includes approximately 200 vehicles; 90 in the city area, 45 operating from the warehouse, and 70 in the suburban territory. The 1,000 vehicle days taken as a unit of measure represents the record of 200 trucks operating 5 days. The figures given are average for those trucks in the period of a year.*

Corner of
Lafayette and First

Look for the large green sign on the roof



To Those Who Visit Detroit

In the Fort Shelby is every facility for making your stay in Detroit a very pleasant one—900 reposeful, Servidor-equipped guest rooms, four excellent restaurants, and the thoughtful consideration of your needs.

Whether you choose one of the many excellent rooms at $3, $3.50 or $4 a day, or one of the especially large rooms or suites overlooking the city, or the river and Canadian shore, you will enjoy a particular sense of value in the Fort Shelby. Guests driving to the Fort Shelby are relieved of the care of their cars at the hotel entrance.

HOTEL FORT SHELBY

Detroit

Maynard D. Smith, *President*

J. E. Frawley, *Managing Director*

the interest in safety from the point of view that the man's salary was affected under this system only for his particular accident day.

A definite improvement was noticeable when the salary-review system was introduced together with individual training. On this basis every salary is reviewed every six months with the safety record of the driver the dominating factor, though not the entire factor. The driver is entitled to an increase if he has a clean record for eight months. If he has had a generally good record in the past the decision may be made at the six months salary review period to authorize an increase two months ahead, assuming that the driver has a clean record for the entire eight months by that time.

The salary-review has the advantage that the driver is thinking in terms of his permanent status and income with the company, rather than the occasional aspect of the bonus. In other words, under the salary plan a no-accident driver continuously increases the status of his earning power assuming that his record is satisfactory in other particulars.

The salary-review, furthermore, brings up the consideration of each man as an individual and there is a personal conference with each driver every six months wherein he is told why he received or did not receive an increase.

NO ACCIDENTS — HOLD THE LINE !
ONLY 2 DAYS LEFT
PULL FOR THE BEST ACCIDENT RECORD EVER MADE BY MACY DRIVERS
YOUR ACCIDENT RECORD

This department store has found that the advantages of the blackboard are numerous in safety work.

Personal Conferences

IN instituting the new plan after the mass meeting idea was abandoned, the Superintendent of Delivery talked with one or two drivers at a time as the opportunity arose, explaining the no-accident policy of the store, telling what types of accidents would be considered the fault of the driver, and giving the reasons therefore—training by the

operating head, the most effective kind.

There are several advantages in this method.

First of all the superintendent talks with the driver on some day when he has come in early from his route and accordingly is not overtired and anxious to get home.

He talks with him when the day's work is done and, therefore, the driver's mind is free.

The personal talk gives an opportunity for establishing the good will of the store, for conversation wherein the driver has an opportunity to raise questions and where the instructor can be certain that the driver understands the program.

In addition to outlining the plan to the entire force in this manner the superintendent also talks with each man following any accident, with the thought not only of determining the details and responsibility, but also of preventing further occurrences.

These two changes of salary-review and individual conferences brought the rate down from twelve to seven as indicated above.

Motor School and Elimination Tests

TWO further steps were undertaken to bring down the accident rate.

The first of these was the institution of a general examination which included the time reaction, the physical condition, and the home surroundings of the applicant. Any one of those elements may affect the fitness of a man as a driver. Experience has indicated, however, that only a relatively small proportion of accidents are due to general unfitness. It is worth while to be sure to eliminate the unfit, but, in the main, difficulty is occasioned by inattentiveness, lack of training or proper incentives, rather than by inability.

The motor school was the outgrowth of the discovery that the driver's accident rate was higher in summer. While there is more traffic throughout the nation in summer than in winter this is not the case in the territory in which these trucks operate and it was, therefore, felt that the cause might be found in the fact that the regular drivers were taking their vacations and the helpers were having the accidents.

The motor school accordingly was instituted so that every man driving a truck would not only have a driver's license which, of course, was required in the old system, but likewise would have special grounding in operation methods under expert instruction.

The men taking this training are given three days at the expense of the store where they take intensive training with one instructor for every two students.

The instruction is divided into three parts:

A. Driving Instruction.—This includes proper method of making right and left turns, parking, backing, stopping at given speeds, cautions against driving on trolley tracks, etc.; and instruction in the safety principles of the store.

B. Store System Instruction.—This is training in the business procedure of dealing with the customer, what to do when packages are refused, returned, etc.

C. Service Instruction.—This tells the driver how to change a tire; the names of engine parts, etc. (so that if there is a breakdown the driver will know how to tell the garage what is wrong).

(*Please turn to page* 48)

Men who have had accidents are referred to the Motor School at the discretion of the Superintendent of Delivery and given training in the specific points on which they are weak.

When the school was started ten experienced drivers were delegated to attend and make criticisms and suggestions in order that the instruction might be thoroughly practical.

After the men are passed by the school and are on the job, the Superintendent of Delivery takes the earliest opportunity to question the new drivers on what they have learned at the school. It is also understood that an instructor from the school will check up on the new man on the route, not as a matter of spying, but as a connection with the instruction to see if the directions are being followed out correctly.

As a result of the elimination tests in the psychological laboratory and training in the motor school, the rate has been furthermore reduced from seven to four, making the total drop in accidents from the rate of sixteen to four in the course of three years.

Safety Principles of the Store

IN personal conferences, the motor school, and the talks with drivers who have had accidents, is stated a definite simple code which establishes whether or not the driver is to be held responsible for the accident.

These may be outlined as follows:

1. Any accident where the driver hits a pedestrian is the driver's responsibility. It is recognized that safe driving is difficult in some of these cases, such as instances where a child runs out into the street or where an adult darts out from behind an elevated post. It is held, however, that it is up to the driver to anticipate the dangers of those situations and drive with greatest caution where there are children or where there is an elevated line.
2. Backing-up accidents are held to be avoidable. Most of these accidents occur after the driver has come out of a house and starts to back-up the street without due caution. This is especially true if he writes up his records and then assumes that the situation is as it was when he got into the truck. This situation is met by requiring the driver to have his helper on guard in the street and to back-up immediately after he leaves his customer, doing the writing of his records after he has done the backing. This ruling has materially cut down that hazard.
3. Running into the car ahead is avoidable. It is held that if the driver is proceeding with sufficient alertness to meet contingencies he will always be in the position to stop in time even if the car ahead stops suddenly.
4. No Macy vehicle has the right of way at an intersection. The store regards it as too costly to have any discussion as to who was at fault in the case of an intersection collision. The driver is definitely instructed always to yield right of way when there is the slightest danger. It is his responsibility to see that he does not collide with another car at an intersection.

The store feels that in these four instances accidents are avoidable and the reduction which it has accomplished by insistence on these principles is regarded as

(*Please turn to page 66*)

A Course *in* Automotive Ignition

By M. Mallory.
President, Mallory Electric Corporation

ARTICLE XIX [Choosing the right type of SPARK PLUG]

PERHAPS it is the opinion of many, especially car owners, that a spark plug is only a simply constructed device having two wires insulated apart, the ends of which form a gap, and that its function is only to furnish a spark in the combustion chamber to ignite the mixture, but there are many other things which must be taken into consideration in the design and manufacture of spark plugs. Due to differences in designs and types of engines, locations of spark plugs, compression ratios, and the variations in temperature around the spark plugs, the spark plug problem is a more difficult one than many realize. Because of this fact, the design and manufacture of spark plugs has become very highly specialized.

The converting into power of the highest possible percentage of the fuel used, which determines the efficiency and economy of the engine, depends largely upon the most instantaneous ignition and the completeness of the combustion. The ease with which the car handles at low speeds, the pep it shows under acceleration and high speed and the power on hills, depends upon the completeness of the combustion. The spark at the points of each spark plug must be of full capacity at all engine speeds and under all conditions of operation to give the proper initial impetus for the almost instantaneous burning and expansion of the compressed gas and this is very definitely dependent upon the efficiency of the spark plugs themselves and their operating condition. Otherwise there is a lag to the burning process and a sluggish performance of the whole car as a result.

It is very necessary that the spark plugs be of the right type for the vehicle in which they are used and that they be well designed and well made—they must run reasonably hot at lower engine speeds to keep free from oil and fouling matter, and at the same time must run cool at the top engine speeds, and they must perfectly insulate the high tension current at all speeds, and at all changes in temperature to which they are subjected throughout the range of engine operation.

If the spark plugs are not of the right type or are inefficient, the compressed gas does not burn with sufficient rapidity, there is not com-

plete combustion, and only part of the fuel used is converted into power—some of the balance goes out of the exhaust valve in the form of unburned gas, and some of it remains as a residue in the cylinder and forms carbon, which further interferes with proper development of power and satisfactory performance.

The spark plug is of such great importance under all conditions of operation that one should have a detailed understanding of it and its most necessary function.

Thus, it is plainly evident that it is poor economy to use anything but the best and most efficient spark plug, because it soon pays for itself by a more complete combustion with maximum development of power from the fuel used and the elimination of waste in the form of partial power only due to the excess of unburned fuel.

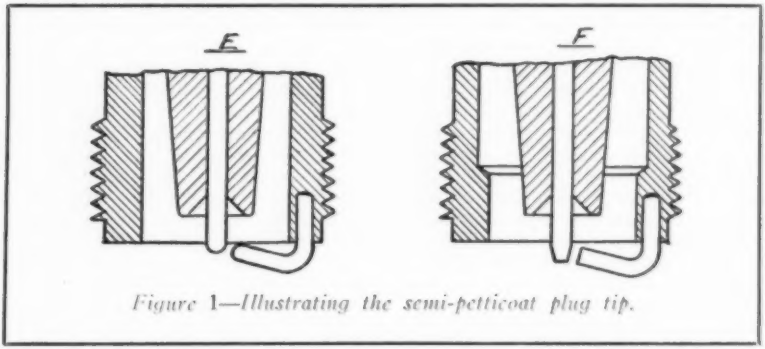


Figure 1—Illustrating the semi-petticoat plug tip.

Spark Plug Insulators

IT is most important that the material used in the manufacture of the insulator be sufficiently strong electrically to absolutely insulate the central electrode at all temperatures encountered in engine operation. An insulator might be perfect when cold but when extremely hot the current would leak through it, causing the spark to be weak or the engine to miss. Two kinds of insulators are used, mica and those of ceramic or baked clay materials.

Mica is an excellent insulator but it is very difficult to make oil proof when subjected to the conditions under which it operates in an engine. Mica insulators are made up in two forms, laminated washers or of the cigarette type, that is, thin mica sheets wound around in the form of a hollow tube. Difficulties in the manufacture and the inability to resist oil have caused the mica insulated spark plug to become almost obsolete.

The ceramic or baked clay type insulator is almost universally used. This type of insulator is made from various clay and mineral rock deposits. The raw clays are ground up extremely fine, mixed with the necessary binder, formed and baked at extremely high temperatures to make them thoroughly vitrous.

It is possible to make these insulators sufficiently strong electrically to absolutely prevent leakage at temperatures encountered in engine operation. The latest developments

have brought out material which along with electrical properties will stand intense heat shocks and is practically unbreakable.

Semi-Petticoat Tip Insulators

PRACTICALLY all insulators in spark plugs now have the so-called "semi-petticoat" tip. This is shown at E and F in Figure 1. The shape of this insulator is such that it provides a heat gradient, which prevents overheating of the thin edge but still allows this thin edge to retain sufficient heat to burn off the carbon, which prevents the plugs from fouling. This is proven by the fact that this type of insulator is used in the hottest of racing engines.

Electrode wire must be, of course, electrically conductive and at the same time offer a high heat resistance. It must resist oxidation to the highest possible degree so as to avoid pitting and burning, which will widen the gap beyond the allowable limits. Nickel is the base of all electrode alloys.

Thread Sizes Used on Spark Plugs

SPARK plugs are made in three thread sizes, ½-inch, ⅞-inch and metric.

The "½-inch" is the ordinary Briggs Standard Pipe Thread, 14 threads to the inch. As the threads are tapered in this type of plug, no gasket is required.

The "⅞-inch—18" is ⅞-inch outside diameter, having 18 threads per inch. It has been adopted as standard for automotive use by the Society of Automotive Engineers. Until about a year ago it was used almost universally on American engines.

The "metric" is the International Foreign Standard, 18 mm. or .707 outside diameter and 1½ mm. pitch, which equals about 16¾ threads per inch. This size has been used universally on aircraft engines, and has been the universal standard in foreign countries for automotive use. During the past year quite a few of the manufacturers in this country adopted it when they changed to high compression engines, largely because plugs for the high compression cars were already available in this size.

Spark plugs are made in three different hex sizes, largely to meet the demand for engine designers. The 1⅛-inch hex has been used for many years more as standard than the other types. The one-inch hex is the International Aircraft Standard and is used on all metric plugs. The 15/16-inch hex is standard for the ½-inch pipe thread plugs.

In a few instances manufacturers have built engines with clearances so small that it has been necessary to make plugs with ⅞-inch hex.

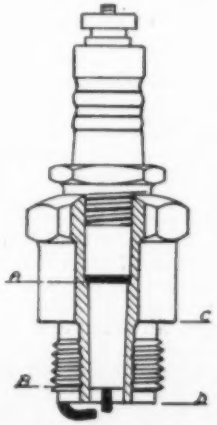


Figure 2—A hot plug designed for a cold engine.

Spark Plug Types

(*Continued from page* 51)

SPARK plugs are built with varying lengths from the outside gasket seat to the end of the shell for two reasons:—first, to accommodate the plugs to the varying thicknesses of cylinder heads; and second, to bring the spark gap in extremely high turbulence engines into a position where the gas stream traveling at extremely high velocity will pass the gap.

It is very important that the right type of plug be used, that is, if the engine is designed for a plug having a long extension, a plug with a short extension should not be used, because, if the short plug were used where a long plug should be used, the spark gap would be in a pocket and the gas would not reach combustible stage at the place the spark occurs. If a long plug were used where a short plug should be used, the plug would probably overheat, causing pre-ignition.

Hot and Cold Spark Plugs

SPARK plugs must be designed to meet the conditions of service required both by engine design and the condition under which the engines are operated. The principal factor that enters into this part of design is the rate at which the heat may be radiated from the firing end of the insulator to the body of plug or water jacket of engine.

On page 51, Figure 2 shows a hot plug designed for a cold engine, and Figure 3 shows a cold plug designed for a hot engine. Notice the difference in the length of the insulator between A and B. No. 2 has a long insulator and No. 3 has a short insulator. The heat will pass faster from insulator in plug No. 3 to the plug body or water jacket than it will in plug No. 2; consequently, the insulator in plug No. 3 will remain much cooler than the insulator in plug No. 2.

In the so-called "hot-type" spark plug, which is designed for service in comparatively cold running engines where not much heat is developed, the insulator must be seated high in the shell, which makes it necessary for the heat to travel a comparatively great distance to reach the water jacket. This long travel of heat means that with even comparatively little heat applied, considerable of it will be stored in the insulator and as a result the insulator itself will remain hot enough to keep the oil and carbon burned off.

In the cold plug, which is designed for hot running engines, the insulator must be seated comparatively low so that the heat need travel a comparatively short distance to the cooling medium, preventing the insulator from overheating. Engines using this type of plug develop greater heat than the engines using the hot spark plug; consequently, sufficient heat is applied to keep the insulator clean.

There are many engines that are not performing properly because they do not have the right type of plugs in them. The spark gap may not be located low enough in the combustion chamber to be in the path of the incoming mixture or the engine may fire ahead of time due to the plugs getting too hot. The plugs may foul badly, caused by the plug running too cold. The electrodes may be badly burned, which offers high resistance to the spark, reducing its heat.

Body of Spark Plugs

IN some plugs the body is made into one piece, that is, the insulator is crimped into the body. This is known as the one-piece plug. Some manufacturers make a two-piece plug. The insulator is held in with a bushing instead of being crimped in. The advantage of this is that the plug can be taken apart to be cleaned and inspected. Sometimes the insulator is cracked above the lower gasket, which cannot be detected unless the plug is taken apart. The engine might operate perfectly at normal speeds, but on hills and acceleration the compression would cause the spark to go through the crack in the insulator.

Other very important things in the construction of spark plugs are the gaskets and manner of assembly. If the gaskets do not make the plug perfectly tight, hot gases will leak by the insulator, overheating the plug and causing pre-ignition.

Another item of construction which also has to do with the design is the matter of gap-setting and the shape of spark points in relation to each other. While this seems to be a very small item, it is one of the most important in a spark plug. The shapes and forming of gaps is, of course, a matter left to the spark plug engineer. Recent experiments have, for example, shown a considerable difference in starting ability and life of different electrodes. For the sake of illustration, E and F will be referred to in Figure 1. The type shown at F causes easier starting than the type shown at E. The life of the electrodes in the type shown at F is also longer than the life of the electrodes shown at E.

In connection with gapsetting, much care should be used so as to set them reasonably exact. The eye cannot be trusted for accuracy. A

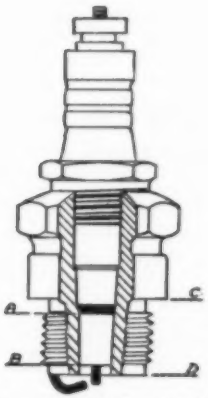


Figure 3—A cold plug designed for a hot engine.

feeler gauge should be used in all cases. For ordinary operation, from .025 to .030 will give good average service, but, with the advent of the various modern types of ignition systems, it is essential that the instructions given either by the ignition manufacturer or car manufacturer be followed. Every mechanic should be equipped with a feeler gauge, and a proper pair of small nose pliers for gapsetting. The central electrode sould never be moved, because if it is moved from its normal position, the insulator will split when heated.

The average of the plugs on the market today have a clearance from the top of the shell or bushing to the terminal to allow for a maximum gap of .035. Setting the gap wider than this will cause the spark to jump over the insulator or a leakage somewhere on the outside in the secondary circuit.

Setting the spark plug gaps too close together to overcome hard starting, engine missing on pulls or at high speeds is not advisable be-

cause the electrodes will burn away rapidly and the performance of the engine will not be as smooth, especially at low and idling speeds.

Changing of Spark Plugs

THE spark passing from one electrode to the other oxidizes the metal, which sets up a high resistance to the electric current. The older the plug is, that is, the longer it is used, the greater the oxidation and electric resistance. This high resistance at the spark plug gap causes the secondary current to leak away from the conductors on the outside, causing a loss of heat in the spark.

After long usage, carbonaceous matter is burned into the surface of the insulator, which permits a leakage of the current. Although this may not cause the engine to miss, the performance will not be as good as it would be if a new set of plugs were installed. Manufacturers today are recommending that the spark plugs be changed every 10,000 miles.

It is very essential that the specifications of spark plugs for each type of engine shown on the charts supplied by the plug manufacturers should be followed.

New G. M. C. Appointments

ANNOUNCEMENT was made recently of the appointment of John M. Howard as Assistant Sales Manager of the General Motors Truck Company, in active charge of sales extension. The latter constitutes an important part of the company's aggressive and wide spread expansion program for 1930. Before his appointment to his new post Mr. Howard served as Advertising Manager of the organization. He has had some fifteen years of practical, successful experience in the automotive industry, cars and trucks, in both advertising and sales capacities.

A co-announcement was made of the appointment of Henry T. DeHart as the new manager of Advertising and Sales Promotion for the General Motors Truck Company. He likewise has a long successful record in automotive advertising and merchandising. Prior to his advent into the organization early in March, 1929, he was for eight years Advertising and Sales Promotion Manager of the Reo Motor Car Company for both the passenger car and truck divisions.

Manual on Studebaker Busses

AN illustrated manual of instructions containing practical methods of servicing Studebaker busses has been compiled by Studebaker.

The manual has been written in plain words, so that it will be possible to thoroughly understand each individual operation.

Investigations made by Studebaker have revealed the fact that all large and leading bus operators have a definite schedule of preventive maintenance. This is because they know it is false economy to wait until a failure occurs when proper service and inspection will prevent the breakdown, and at a considerable saving. For this reason the first part of the book is devoted to this subject. This has been done to help the bus operator establish and maintain a preventive maintenance schedule.

Another part deals with the correct method of servicing a new bus preparatory to placing it in operation. The remaining portion of the book tells how to proceed in servicing each mechanical part. Send your requests for free copies to the Editor of this publication.

The Trouble Shooter

A DEPARTMENT devoted to correspondence from readers of The FLEET OWNER. Any questions having to do with fleet maintenance will be answered. All properly signed inquiries will be replied to by mail and such of them as are believed to be of interest to other readers will be published in these columns.

Address your questions to the Trouble Shooter Editor. We must decline to reply to correspondence not signed with the writer's full name and address. The inquirer's name will not be published.

How to Fit Lapped Pins

Question: How tight should the wrist-pins be fitted in Lynite, Bohnalite and iron pistons? We are contemplating using lapped pins and want to know if it is really true that lapped wrist-pins should be fitted looser than pins that are not lapped? —A. K., Fort Lee, N. J.

Answer: It is important to know what type of oiling system is used in the motor, before fitting pins. Where the pins are directly lubricated by force-feed the clearance for lapped pins should be .001" to .002". Engines having pins lubricated by splash should have a clearance of from .0005" to .001".

In no case should the clearance be less than .0005" nor more than .002". According to a prominent pin maker, lapped pins will give satisfactory service when fitted with plenty of clearance, or an *apparently* sloppy fit.

The theory of lapped pins is that the "fuzz" has been removed from the surface of the pin by the lapping process and that the lapped pin does not wear any smaller in diameter when subjected to service during the first few thousand miles. Therefore it need not, in fact, *must not* be fitted tightly, but should be fitted with the above clearances in order to allow space for a film of lubricating oil.

In the case of semi-steel or iron pistons the pin should be fitted so that a light finger pressure will insert the pins in the bosses. In alloy pistons, where the pin moves, this method is also correct.

Where the pin is full-floating or of the locked type, the alloy pistons should be slightly warmed in hot water and the pin pushed in with the finger. This will give a tight fit when the piston cools.

While fitting the pins, it will also become quite necessary to check up the alignment of the rods, as no matter how good your fit is, a poor job will result if there is any misalignment, sprung or bent connecting rods. It is important to remember that a lapped pin needs no running in and that good clearance must be provided.

(Editor's Note: The subject of lapped pins is very comprehensively

taken up in a booklet recently published. A wall-chart also shows up the correct procedure in fitting lapped pins. These were sent to the above subscriber, along with our reply. If there are any other readers of this publication who desire a free copy, I will be very glad to send it, without cost or obligation. Just drop a line to the Editor, and ask for a copy of "How to Fit Lapped Pins." This is a free service that all should take advantage of.)

A Rear-End Hint

Question: In working on Chevrolet rear-end jobs, we try not to take the rear axle housing off the car. We do not have any trouble until it comes to replacing the drive-shaft assembly. There is a floating iron ring that the three screws in the housing have to bear up against. Our hard part of the job is to get this ring up against the double-row bearing, so that the screws can be inserted. What suggestions can you offer?—R. M., New York, N. Y.

Answer: It is usually best to take off the axle, by unhooking the spring u-bolts, the brake rods and the rear spring shackles. The whole axle assembly, with driveshaft housing, will then pull off the universal joint.

If you do this, the assembly can be held vertically, when putting the drive-shaft back, and the washer or iron ring will then fall into place.

When the axle is *not* removed from the car, some mechanics use a piece of cardboard as a spacer, folded in three parts and tied with a string, so that when assembled, the washer mentioned will not slip back.

Another easy way to do this is to put the drive-shaft assembly in place, tap the pinion bearing into the housing, and then by means of a hat-pin or knitting needle, push the floating washer up into place. The hat-pin is inserted from the back—between the balls in the rear pinion shaft bearing, and is used to push the washer towards the front of the car.

This is a two-man job, however, as one has to hold the hat-pin and poke around, while the other watches through the screw-holes and inserts the tapered screws. It is much easier, for various reasons, to take the entire assembly off.

Alco-Tester Explained

Question: I have read somewhere of an instrument called the "alco-tester", which I believe is an instrument for determining the amount of alcohol in the cooling system. Will you please tell me how this works?—L. J. Ogunquit, Me.

Answer: The alco-tester, illustrated here, is a hydrometer-like instrument, utilizing a thermometer and float, encased in a Pyrex glass tube. A scale, read with reference to the thermometer level, gives the freezing point of the solution in the radiator.

The testing is simple. A wall chart, issued in conjunction with the instrument, enables the user to determine exactly how much additional alcohol is needed to insure protection against freezing at any given temperature.

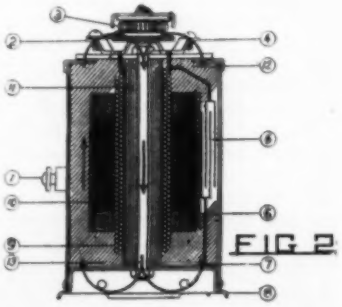
These instruments are furnished by wholesalers who handle alcohol, together with the wall chart men-

tioned, both for one dollar. If you are using alcohol this winter, we would advise you to get one of these, as it will help you get the maximum service out of your alcohol, at the minimum cost.

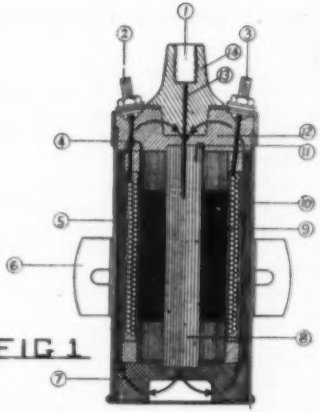
The alco-tester is sponsored by The Industrial Alcohol Institute, 420 Lexington Ave., New York City, who will be glad to send any fleet owner further information on the subject, without charge. If you prefer you can write to the Editor for same.

A Condenser is Necessary

Question: Kindly tell me why a Chevrolet coil will work on a Pontiac car, but the Pontiac coil will not work on a Chevrolet. We have just made a swap, in order to get the Pontiac car on the road sooner, and instead of buying a new coil for the Chevrolet, we used the Pontiac coil (a new one) which came in later on a back order, but it will not run the car.



This is a coil of the Chevrolet type. Note the built-in condenser, indicated by circle 5.



Coil of the type used in Pontiacs, having no condenser.

We had to send it back and exchange it for a coil of the Chevrolet type. Our jobber did not know why it would not work. Can you tell me?—W. D. Ridgefield Park, N. J.

Answer: The answer is very simple. The Chevrolet coil (we presume this is one used on a 1928 or earlier model) has a condenser incorporated in the coil itself. The Pontiac coil does not have a condenser, the latter is mounted on the distributor in this case.

The Pontiac car, using the Chevrolet coil, will work with two condensers, but the Chevrolet car, using the Pontiac coil and no condenser, will not work. If you want to use the Pontiac coil (or any other similar coil) on a Chevrolet four-cylinder car, it will be necessary to get a condenser. This should be connected in parallel with the breaker points, and be mounted as near as possible to the breaker points, preferably on the distributor housing.

Retail Delivery Convention

THE fourteenth annual Convention of the Retail Delivery Association will be held at the Cleveland Public Auditorium in the City of Cleveland, Ohio, on March 18th to 21st inclusive.

Four full-day programs have been arranged, to include many subjects most pertinent to changing delivery conditions. Ten papers will be delivered on various subjects, by speakers who are authorities on their topics.

Some of the subjects to be discussed are: Construction and Design of Truck Bodies for Retail Delivery; Electric Trucks in Delivery Service; Drivers' Uniforms; Accident Prevention; Ideal Painting Processes for Delivery Trucks; Modern Service Buildings, etc. Round table discussions will also cover such topics as Problems in Traffic Regulations; Insurance; Unit Packing, etc.

A banquet will be held Wednesday evening, March 19th, at the Hotel Statler, at which time the Honorable Lee E. Skeel, Municipal Court Justice of Cleveland, will be the guest speaker.

Several thousand square feet of floor space have been set aside at the Cleveland Public Auditorium for vehicles and other devices used in conjunction with delivery operation. Many new and interesting exhibits will be offered by the various firms showing their merchandise.

Other features scheduled are: inspection trips to the service departments and remote stations of The May Company, The Halle Brothers Co., The Higbee Company, and others. The White Company has extended an invitation to the delegates to visit their factory, and a trip is being planned.

An open invitation to attend this Convention is being issued by the Association, requesting firms to send their delivery, garage, packing, service managers and others in their stores, whose work has any bearing or contact with the subject of delivery.

Some of the interesting papers to be presented at this Convention will subsequently be published in this publication. Watch for them.

Can Brakes Be Too Good?

RECENT experiments indicate that a deceleration of 6 miles per hour per second is about the maximum that can be employed, when the safety of passengers is considered, said Thomas S. Kemble, who addressed the Society of Automotive Engineers at its Transportation Meeting. He cited an instance in which a passenger standing in the middle of a motorcoach was thrown almost against the dashboard of the vehicle and flat upon his face following a sudden emergency application of the brakes, and said this was an indication that some maximum decelerating ability of a braking system should be specified for both city and interurban operations. Mr. Kemble believes it is detrimental to have the brakes too powerful.

On the contrary, A. W. Scarratt, of the International Harvester Co., said that, because so many hazards must be contended with on the road, the best brakes that can be provided are none too good to meet emergency conditions. His company attempts to provide a brake that will give a rolling stop, with the wheels just bordering on a tire slide or skid under maximum-load conditions on dry pavement.

▪ WORTH READING ▪

Aluminum Bodies: Cost information, showing savings to be made by the use of aluminum bodies, may be obtained, free of charge, from Aluminum Company of America, 2461 Oliver Bldg., Pittsburgh, Pa. This interesting literature should be in every fleet owner's hands.

Ball and Roller Bearings: Literature on all types of ball and roller bearings, particularly those for heavy-duty installations, is offered free by Bearings Industry Corporation, 1834a Broadway, New York City. Please mention the FLEET OWNER when writing.

Dodge Trucks: Interesting booklets on all types of Dodge trucks, busses, delivery and other vehicles are offered by Dodge Brothers Motor Corp., Detroit, Mich. When writing, please state the type of vehicles you are interested in.

Wheel and Rim Manual is offered by Fisk Tire Company, Commercial Tire Department, Chicopee Falls, Mass. This book is complete and detailed. It shows the most efficient and least expensive way to apply proper tire equipment to meet present-day operating needs. This expensive book will be sent free to any reader who writes for same on his firm letterhead, mentioning this publication.

Water Pump Parts, packings and kindred items are illustrated and described in the latest edition of the Grapho Catalog, just off the press. A free copy may be obtained from Grapho-Metal Packing Co., Indianapolis, Ind., if you mention this publication.

Wheel and Sprocket Pullers: Interesting literature on wheel pullers, sprocket pullers and other truck service tools, is offered free of charge by The Greb Company, 310 State St., Boston, Mass. Fleet owners are invited to write for this free literature.

Brake Reliner's Manual is offered free by Johns-Manville Corp., New York City, N. Y. This is a comprehensive handbook covering all aspects of the application and servicing of brake lining. Should be in the hands of every fleet operator. Will be promptly sent without cost if you mention this publication.

Brake Material Book entitled "Friction Materials for Buses" is offered free to those in the bus business. This contains an interesting discussion on modern frictional materials used in present-day brakes. Write to Johns-Manville Corp., New York City, for your free copy.

Valve Lifters; Wheel Pullers: New lifters to service the latest models of cars, trucks and busses have been developed by The K-D Mfg. Co., Lancaster, Pa. Wheel pullers of various types are also offered. A series of small tool literature will be sent to you free, if you mention this publication when writing.

Brake Drums; Axle Shafts: Catalogs that completely describe these two lines of important major replacements, are offered by Lempco Products, Inc., Bedford, Ohio. A copy should be in every Superintendent's hands. Write directly to the company for same, or to the Editor, if you prefer.

Toledo Valves are interestingly described in a new "Catalog S" that will be sent free to any of our readers. If you are interested in valves made of a new type of steel, said to be more heat-resisting than ever before, it will pay you to write for this. Address Toledo Steel Products Co., Toledo, Ohio.

Nonscor Brake Lining is described in a new catalog issued by Union Asbestos & Rubber Company, 18th St. & 54th Ave., Chicago, Ill. This is a flexible brake lining that is said to be ideal for internal and external brakes. Write for full information, mentioning this publication.

Vellumoid Packings: Samples of Vellumoid sheet packings and ready-cut gaskets will be sent to you if you are interested in these products—and you should be. Address The Vellumoid Company, Worcester, Mass. When writing, please state whether the literature only is desired, or if you want samples too.

Willard Batteries: A catalog on heavy-duty batteries for truck and bus service will be sent to any reader on request. Write directly to Willard Storage Battery Co., Cleveland, Ohio, mentioning this publication.

Note: All of the above books are offered free of charge. Write for any that interest you. If this is your busy day, tear out the page, check those desired and mail to the Editor. We will see that you are promptly supplied.

New Weed Cross Chains

A NEW tire-chain said to give double the wear, was introduced this winter by the American Chain Company, Inc., Bridgeport, Conn.

THE NEW CROSS CHAIN

In the above illustration, the e-enforcing bars will be noted. These are compression-welded to the cross chain. The wear in these bars alone, before the cross chain proper comes into contact with the road, is as great as with ordinary chain. The bars also strengthen the cross links against early breakage.

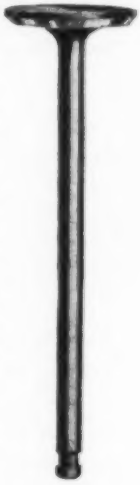
WHEN THE CROSS CHAIN WEARS

This illustration shows the reenforcing bars worn half-way through. Note the worn spots on the cross chain proper. It is just coming into play. This cross link now has more service left in it than a new cross chain of conventional design, it is claimed.

The side chains of the new Weed tire chains are now made of narrow links, electrically welded, to give greater strength. More links per foot make it more flexible. An interesting folder giving sizes, types and prices is available on request. Write to the Editor, or to the company mentioned above.

What YOU *New Products of Interest*

New "Super Steel" for Valves

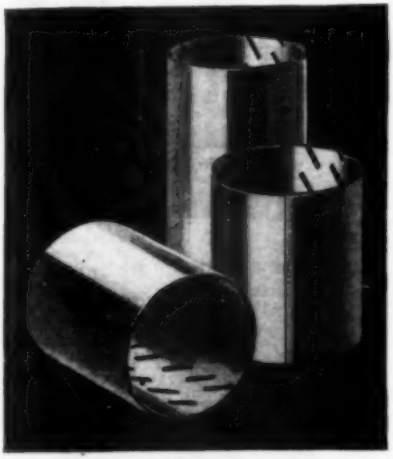


THE development of the new "super-steel" for valve use is announced by Toledo Steel Products Company, makers of Toledo Valves.

Chemists and metallurgists of the company, in cooperation with experts in the laboratories of a large steel company, developed this new super-steel some months ago, as a valve steel more nearly impervious to motor heat than heretofore has been used in the manufacture of valves, it is reported.

As a result of gruelling tests made by several motor manufacturers, the Toledo Steel Products Company has secured several original equipment contracts for 1930 to take care of, in addition to the rapidly increasing demand for Toledo valves in the replacement field. In view of this, it has been necessary to expand production facilities even more rapidly than was originally planned by the company.

WANT *to* KNOW



New Self-Lubricating Bearing

A NEW self-lubricating bronze bearing, said to be the only one of its kind, has just been announced by Johnson Bronze Company, New Castle, Pa., makers of bronze bushings, bronze bearings, bronze castings, cored and solid bar bronze.

According to P. J. Flaherty, president and general manager of the company, the new bearing provides for a uniform area of bearing surface on the pressure line, and insures an efficient distribution of lubricating compound. The compound used is also a Johnson Bronze development.

The improved results are obtained by a new method of effecting indentations in the metal and by placing them on an angle of 30 deg. Patent covering this method has been applied for. According to the manufacturer, it is only by cutting these indentations that an effective receptacle can be formed for the lubricating compound.

Much interest has been evinced already, especially by the makers of machinery and parts subject to intermittent or periodical operation, such as brake levers, clutch levers, shock absorbers, rocker arms, slow running journals, starting motors, landing gears, guide rollers, sliding door rollers and the like.

New Gasket Catalog

A NEW 1930 edition of Fitzgerald's complete "Never-Leak" master gasket catalog is offered free to our readers.

If you haven't received your copy, write to Fitzgerald Mfg. Co., Torrington, Conn., mentioning this publication, or directly to the Editor if you prefer.

The new catalog, shown here, illustrates and describes a complete gasket service.

EQUIPMENT *for* GARAGE *and* SHOP

Two New Tappet Wrench Sets

J. H. WILLIAMS & CO., "The Wrench People" of Buffalo, N. Y., announce two new sets of tappet wrenches that service practically all makes of cars.

These new wrenches, drop-forged from a special analysis of alloy steel, are priced low enough to put them within the reach of every mechanic and service man who has need of high class wrench sets for tappet adjustment. They are unusually light in weight, long and narrow in design and are carefully heat-treated for maximum strength. Each is guaranteed against breakage.

Williams' Tappet Set No. 42 has eight of the new Special Alloy Wrenches with openings 7/16" to 7/8", packed in leatherette roll.

Williams' Tappet Set No. 32 consists of six of the new wrenches with openings 7/16" to 11/16", also packed in leatherette roll. Prices and specifications are available from the manufacturers on request. Write for circular, mentioning this publication.

New Westinghouse Charger

A NEW Rectox rectifier for charging batteries by means of copper oxide rectification is announced by the Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa. Employing the copper oxide principle this charger presents a simple, safe, and satisfactory means for charging storage batteries in all applications.

The Rectox is easy to operate. It is necessary only to plug into any available lamp socket, attach the d.c. leads to the battery terminals and turn on the switch mounted on top of the charger. A few hours charging will put renewed life into the battery with no attention whatsoever.

Being light in weight, the Rectox can be moved to the battery easily. The trouble usually encountered in moving heavy batteries is eliminated. In automobiles the charger may be placed on the running board, making the connections with the battery left in place in the car.

The leading feature of the Rectox charger is the fact that there are no parts to wear out or replace, with the exception of fuses which protect both the a-c and d-c circuits. No chemicals or acids are used.

Small Sioux Electric Drills

A NEW product bearing the familiar "Sioux" trade-mark has just been announced by Albertson & Co., Sioux City, Iowa.—electric drills.

The smaller sizes, pictured above, are available in three models, as follows: (Your jobber has them in stock.)

No. 1540—5/16"—9½ lbs.—$50.00
No. 1525— ¼" H. Duty—$45.00
No. 1500— ¼" Std. —$35.00

Some of the features as pointed out by the maker are: momentary switch, with special locking device, arranged so that switch may be held in contact by means of a trigger or by locking the contact when in use for a long period; bodies of aluminum die castings; helical steel gears; ventilated motors; ball bearings throughout, including chuck spindle; Jacobs chucks used.

Full details can be better understood from the complete catalog which is free on request. Write to the company or to the Editor of this publication.

Delivering Fuel Oil

(*Continued from page 28*)

welded across the top of the coil and vertical spacers welded between the upper and lower tier of each section. Fig. 2 is another view of the completed coil.

This coil was designed, fabricated and installed by the welding shop in exactly five days. The oil company stated that other methods of fabrication would undoubtedly have taken much longer to complete the job.

Since installing the heating coil, the loading of trucks from the tank is accomplished in about one-third of the time formerly required.

There is no longer any confusion at the loading platform by waiting trucks and deliveries are expedited.

In short, the ability of his welding shop to render prompt and efficient service has enabled this fuel oil distributor to do the same for his own customers.

Choosing the Right Colors

(*Continued from page 32*)

binations. But as a rule the trend is to a greater delicacy of color than it used to be. Laundry trucks, for instance, may well choose from the soft pastel colors such as Talma brown, Chalice, Brilliantine and Brocatelle green, expressing somewhat the crisp clean idea that a laundry seeks to leave with us.

Neighborhood stores also should consider the colors of their delivery cars just as carefully as they do the signs over their doors. They are a constant advertisement for the people of their vicinity. It is possible to give color personality to even a coal truck. Black and orange and other dark colors used discriminately on coal trucks will make them agreeable to the eye and at the same time they will look clean.

Busses, both inter-urban and city, are rapidly growing features of our transportation method. And what colors to finish them? Well, the range is endless, but this fundamental thought will answer many of the complicated questions that lie around the subject. City streets are crowded with traffic. Why add to the apparent chaos by painting city busses in bright and garish colors? Better use two tones of gray trimmed with scarlet or some of the closely related harmonies of gray blues and greens.

On the other hand, inter-urban busses have a problem quite different. Many times they are the sole means of transportation for the people living along their routes. Their coming is looked forward to with eagerness. They should be to some extent treated like sport cars in color. Let their tones be brilliant so they will not disappear against the greens and browns of the landscape.

And, in busses in particular, the distribution of color is important. In every case it should be so handled that it will make the bus seem stable. Tipping should be far from the mind of the passenger. So dark, rich colors should be kept low and the lighter, sky reflecting colors should be used high on the car. The impression then will be that of stability. The lower part of the car will seem to be a part of the road itself.

Inside the bus, color should be used so as to give it an air of spaciousness. Such cream and pastel tones as Cigarette or soft bright greens as Nyanza and Zanzibar will create a feeling of roominess and freedom, and also will make the passengers less likely to become tired and fretful on a long trip.

Dodge Offers Complete Line

(*Continued from page* 42)

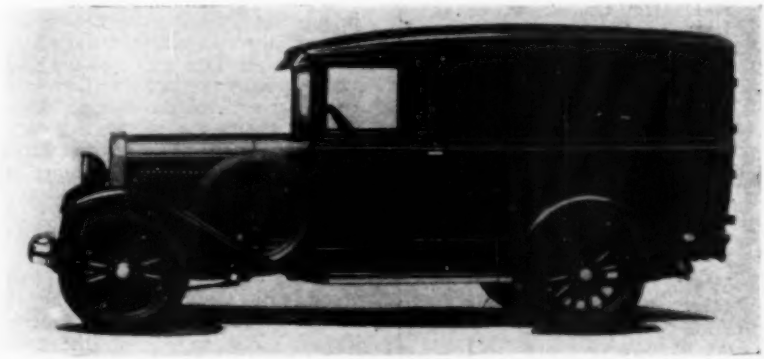
operating speeds. Oil filters, air cleaners, crankcase ventilators and thermostats are standard.

Forty-eight different body types are included in the standard specifications. When combined with the various chassis and wheelbase lengths, varying equipment, gear ratios, tire sizes, etc., the arrangement makes possible 2242 units available for almost every conceivable type of service. This wide range of standard truck combinations is supplemented by innumerable types built to order in the special equipment division of the company.

Dodge Brothers trucks have been steadily improved in appearance to conform to the demands of truck operators in all lines for transportation units that reflect the progressive character of modern business methods. Appearance is given serious consideration by Dodge truck engineers in the construction of every unit, whether standard or special. Graceful lines follow in ordered continuity from the radiator and hood straight through the details of cab and body construction. Attractive color combinations in lacquer and paint give each truck a finished beauty of line that is regarded as a definite business assets for the owner.

Roomy, full-visioned cabs, sedan-type seats with wide and deep cushions, and throttle, spark and lighting control levers conveniently mounted on the top of the steering column insure maximum comfort for the driver. One-piece windshields are easily adjusted for ventilation. Speedometer, carburetor choke, ammeter, oil gauge, and engine temperature indicator are located on the instrument board. Radiator shutters are also operated by the driver from the instrument board.

Tubular propeller shafts are used in all models. In the two smaller capacity models, shafts are one-piece construction and in the larger models two-piece shafts with ball-bearing center supports are used. All rear axles are of the semi-floating, spiral bevel gear type with straddle-mounted pinion and four-pinion differential. The clutch on all sizes is the single plate, dry disc type. Hotchkiss drive is used throughout.



Another well-known model, the half-ton delivery Dodge.

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Reducing Macy's Accidents

(*Continued from page* 48)

definite evidence of the avoidability.

5. No Macy driver is blamed for being run into from behind.

He is expected to signal when he is going to make a stop and under these circumstances his entire energy and attention are needed to stop quickly in order to meet an emergency situation. If some one runs into him from behind under those circumstances he cannot be blamed.

The store emphasizes that under such circumstances and under other principal conditions when the driver is not to be blamed, the instance will not count against the man's record.

As a matter of fact 85 per cent of the accidents at the beginning of this training were occurring on points two, three, and four.

Reasonable Loads

LOAD distribution is arranged so that it is not necessary to speed up the vehicle in order to finish the day's work. The nature of the business is seasonal so that at Christmas time and other busy buying seasons the men work late but at other times they get through early in the afternoon. A fair distribution of the load is cared for by the fact that there are written records of the volume handled by each man which come up before the salary-review committee. To avoid the hazard of speeding in gasoline trucks a governor holds them down to twenty-eight miles an hour. Electric trucks are used in congested areas having a maximum speed of fourteen miles an hour. Speed is not the factor, according to the records, as the ratio of accidents is four to one in the congested districts.